User Manual

Version:3.3.01

ISOMOTION

FIXED RATE CONTROL
VARIABLE RATE CONTROL

ISOMOTION 2CH

17044

ISOBUS CONTROLLER

ISOBUS Solution for Fertilizer and Liquid Sprayer

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SUMMARY

Introduction

The purpose of this document is to describe the operation of the solution **ISOMOTION 2CH**.

The system has the ability to perform the following operations:

- Fertilizer and/or liquid distribution using fixed rate;
- Solid and/or liquid distribution using variable rate;

Hardware/components:

- ECU/Controller with ISOBUS solid and/or liquid distribution software;
- Metal box to house ECU and Master harness;
- Master electrical harness, for connecting the implement controller to the tractor's ISOBUS;
- Implement harnesses, allowing the connection of the master harness to the other components installed on the implement;
- Proportional control hydraulic blocks;
- Sensors, including encoders, for monitoring the rotation of motors present in the system;
- GPS speed sensor, if the tractor does not have another sensor or antenna for speed monitoring.

The complete control solution can be purchased completely, or it can be adapted to the components and sensors already present in the implement. For this, the software has the following component configuration parameters:

- Setup of the individual maximum revs of each valve/engine;
- Selection of the type of speed sensor used;
- Implement Parameter Settings
(application width, dimensions, sections, lines) are provided in the software.

In order to determine solids dosing factors, the system is turned on for a certain period, the dosed material is collected, weighed, and the found value is entered into the software to determine the amount of solids distributed per engine revolution.

Along with this process, there is a gauging routine, which checks the calibration and makes a fine adjustment to the dosage factor, increasing dosage accuracy

In the application of liquids, the operator can choose flowmeters with a frequency (Hz) or current signal (mA), the system identifies the minimum and maximum limits for the application of liquids, then performing the application at fixed or variable rate of pesticides during dosing.

Whatever the parameterized operations, the main screen of the system adapts to the configuration defined for the machine, and real-time monitoring allows the operator to follow the dosing rates of solids and liquids.

There is also a display of the current tractor/implement speed, time totalizers, distance covered and dosed area

Descriptions of the screens, configuration guidelines and system control are presented in the next chapters and are intended to clarify in a clear and intuitive way how to operate the system.

What is ISOBUS?

The ISO 11783 standard (Tractor and machinery for agriculture and forestry – Serial control and communications data network), commonly called ISOBUS, is an international communication protocol for communication between agricultural machines and implements. This standard is composed of 14 parts and regulates from the physical layer (connectors and CAN bus), data layer (format, type, message properties), system controllers (Virtual Terminal, task controller, implement controller) to diagnosis of data, among other numerous information necessary for the standardization of the system.

Through standardization standardized by the ISOBUS standard, it is possible to perform the interaction of a single universal terminal with several models of agricultural implements, making it possible to use the same machine (eg tractor) for various functions, without the need for equipment dedicated to the application (seed, irrigate, plant) or displays for each of the implements used in conjunction with these machines.

System Requirements

To use the system, the machine must meet some minimum requirements, having components necessary to meet the ISOBUS standard (ISO 11783), being able to operate an implement with ISOBUS technology. The next topics describe these components.

The Universal Terminal (UT – Universal Terminal), also known as Virtual Terminal (VT – Virtual Terminal), is the software that creates the operating interface (screens) of the implement on the display present in the tractor cabin.

Some tractors have this functionality installed at the factory by sharing the autopilot display, but it can also be installed later by third parties.

Not always tractor displays are compatible with ISOBUS technology, in case of doubt, contact the display manufacturer.

Universal Terminal

The Universal Terminal (UT - Universal Terminal), also known as Virtual Terminal (VT - Virtual Terminal), is the software that creates the operation interface (screens) of the implement on the screen in the tractor cabin.

Some tractors have this feature installed at the factory by sharing the autopilot screen, but it can also be later installed by third parties.

Tractor displays are not always compatible with ISOBUS technology, if in doubt, contact the display manufacturer.

Below are some examples of Displays that have Universal Terminal technology

- **AgLeader InCommand 1200;**
- **John Deere GS3 / GS4;**
- **Raven Viper 4+;**
- **Topcon X30;**
- **Trimble GFX.**

ISOBUS Connection

The ISOBUS standard establishes a standard socket/connector for tractors and implements. The connector according to ISO 11783-2 provides power to the controller and allows the communication connection from the implement controller to the universal terminal.

Licenças ISOBUS Task Controller

Para operações como troca de dados, corte de seção ou taxa variável, é necessário checar se as licenças para estas funções estão disponíveis. Estas funcionalidades estão integradas a maior parte dos terminais universais e tem o nome de controlador de tarefas (TC – Task Controller).

Licença Task Controller Basic

Realiza a troca de dados entre trator e implemento tais como tempo de operação, distância percorrida, área plantada etc.

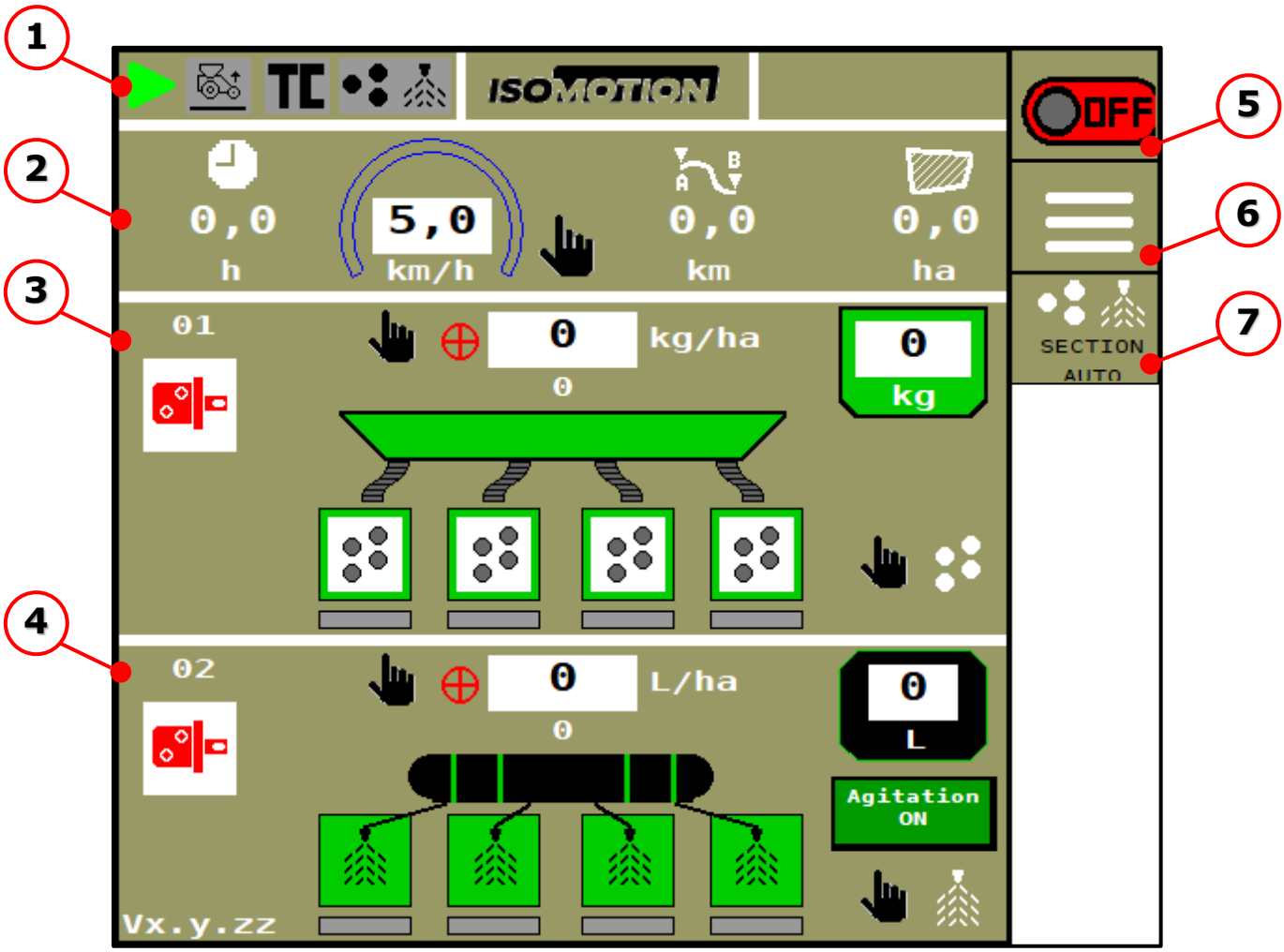
Se não for possível checar esta licença através do software, consulte o manual do terminal universal ou entre em contato com o fabricante do display.

Licença Task Controller Geo-Based

Realiza o envio da taxa de dosagem de material de acordo com o mapa de prescrição e informações fornecidas pelo GPS, é conhecido como controle em Taxa Variável.

Se não for possível checar esta licença através do software, consulte o manual do terminal universal ou entre em contato com o fabricante do display.

Operation Screen

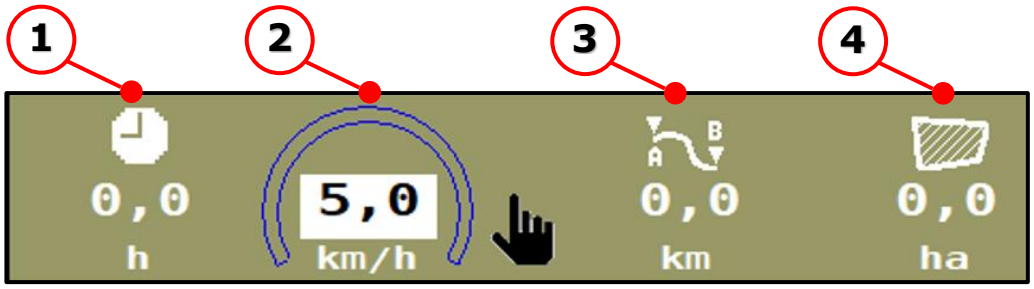


Pos.	Description
1	Information Area
2	Totalized data and Velocity Measurement Area
3	Control Area Channel 1 (Solid)
4	Control Area Channel 2 (Liquid)
5	Controls **On/Off** Button
6	Settings Page
7	Section Auto / Manual

01 Information Area

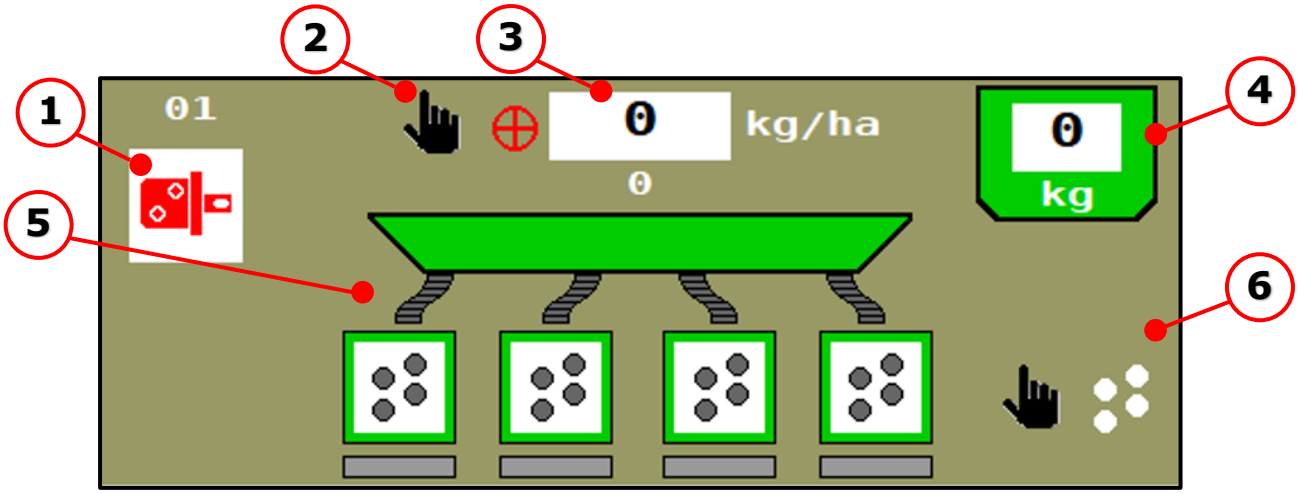
Pos.	Description
1	System On Indication
2	Lift Sensor Disable Implement lowered Implement Lifted
3	Set Point Map Prescription Task Controller Disable Task Controller Enable
4	Enable Channels Solid Liquid

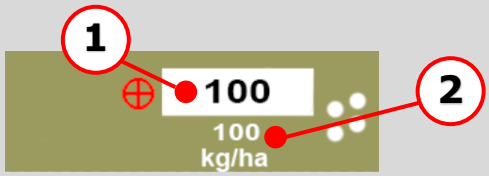
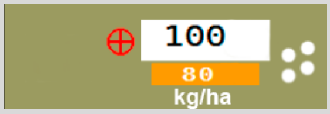
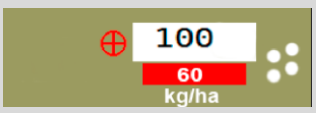
02 Totalized data and Velocity Measurement Area



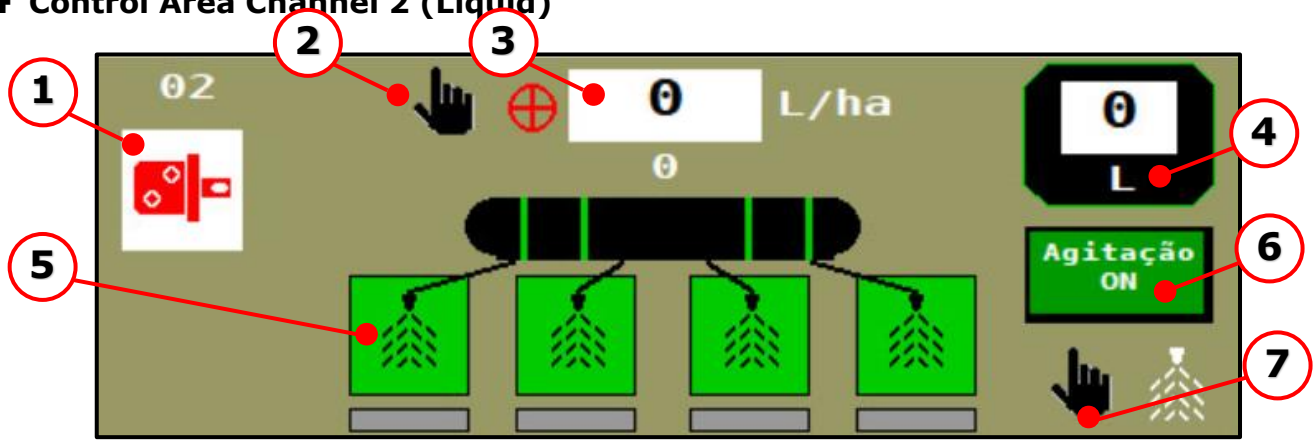
Pos.	Description
1	Partial totaling of hours worked
2	Speed (km/h)
3	Partial Totalization of Distance Displaced (km)
4	Partial Totalization of Worked Area (hectares)

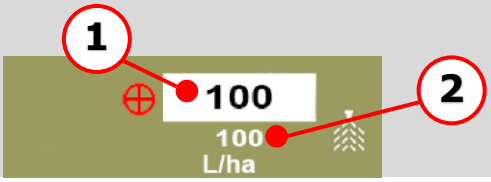
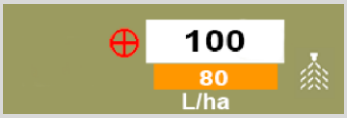
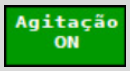
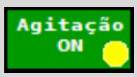
03 Control Area Channel 1 (Solid)



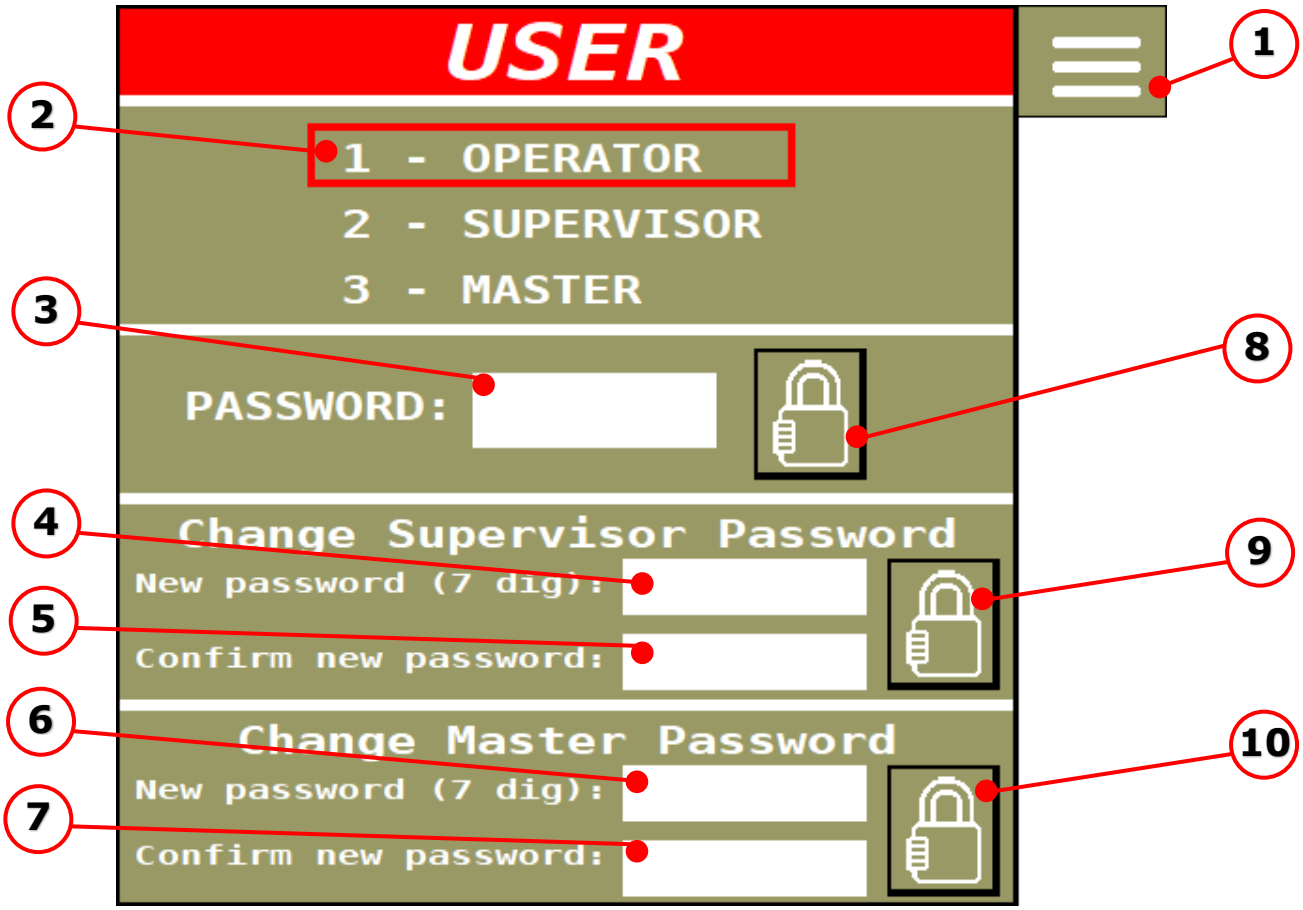
Pos.	Description
1	On/Off Motor Disable Enable Running
2	Dosing Mode: Fixed Rate Variable Rate
3	Set Point  **Pos. / Description** 1 – Field to enter the rate (fixed rate) or indication the Variable rate 2 – Indication instant rate The current rate changes the background color to orange or red if the rate value has a relative deviation.  **If the deviation is greater than + or - 15%, the background color of the current rate field changes to orange.**  **If the deviation is greater than + or - 30%, the background color of the current rate field changes to red color.**
4	Indication of approximate level
5	Number of Dosage lines
6	Section cut in Manual mode

04 Control Area Channel 2 (Liquid)



Pos.	Description
1	On/Off Motor Disable Enable Running
2	Dosing Mode: Fixed Rate Variable Rate
3	Set Point  **Pos. / Description** 1 – Field to enter the rate (fixed rate) or indication the Variable rate 2 – Indication instant rate The current rate changes the background color to orange or red if the rate value has a relative deviation.  **If the deviation is greater than + or - 15%, the background color of the current rate field changes to orange.**  **If the deviation is greater than + or - 30%, the background color of the current rate field changes to red color.**
4	Indication of approximate level
5	Number of Dosage lines
6	Agitation  **Enable**  **Disable**  **Agitation on**
7	Section cut in Manual mode

User Login

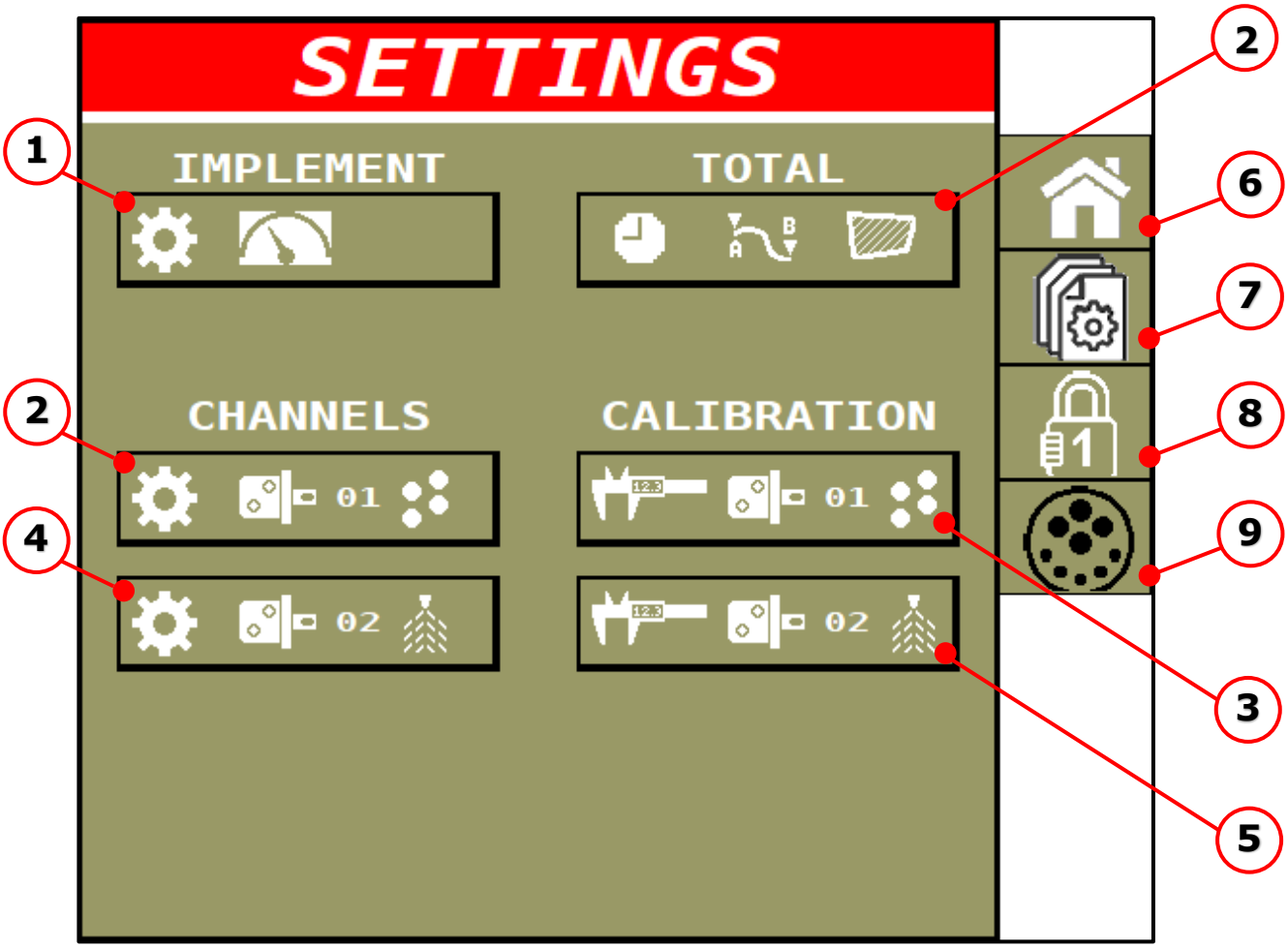


Pos.	Description
1	Settings page access button
2	Indicates which user level is logged into the application
3	Enter the password of the user level you want to access
4	Enter the new password of Supervisor
5	Confirm the new password of Supervisor
6	Enter the new password of Master
7	Confirm the new password of Master
8	Password validation button for the selected user level
9	Password validation button for Supervisor
10	Password validation button for Master

After entering the password, press button (8) to login.

After the user logs in as “SUPERVISOR” or MASTER, he must return to the settings page by pressing button (1).

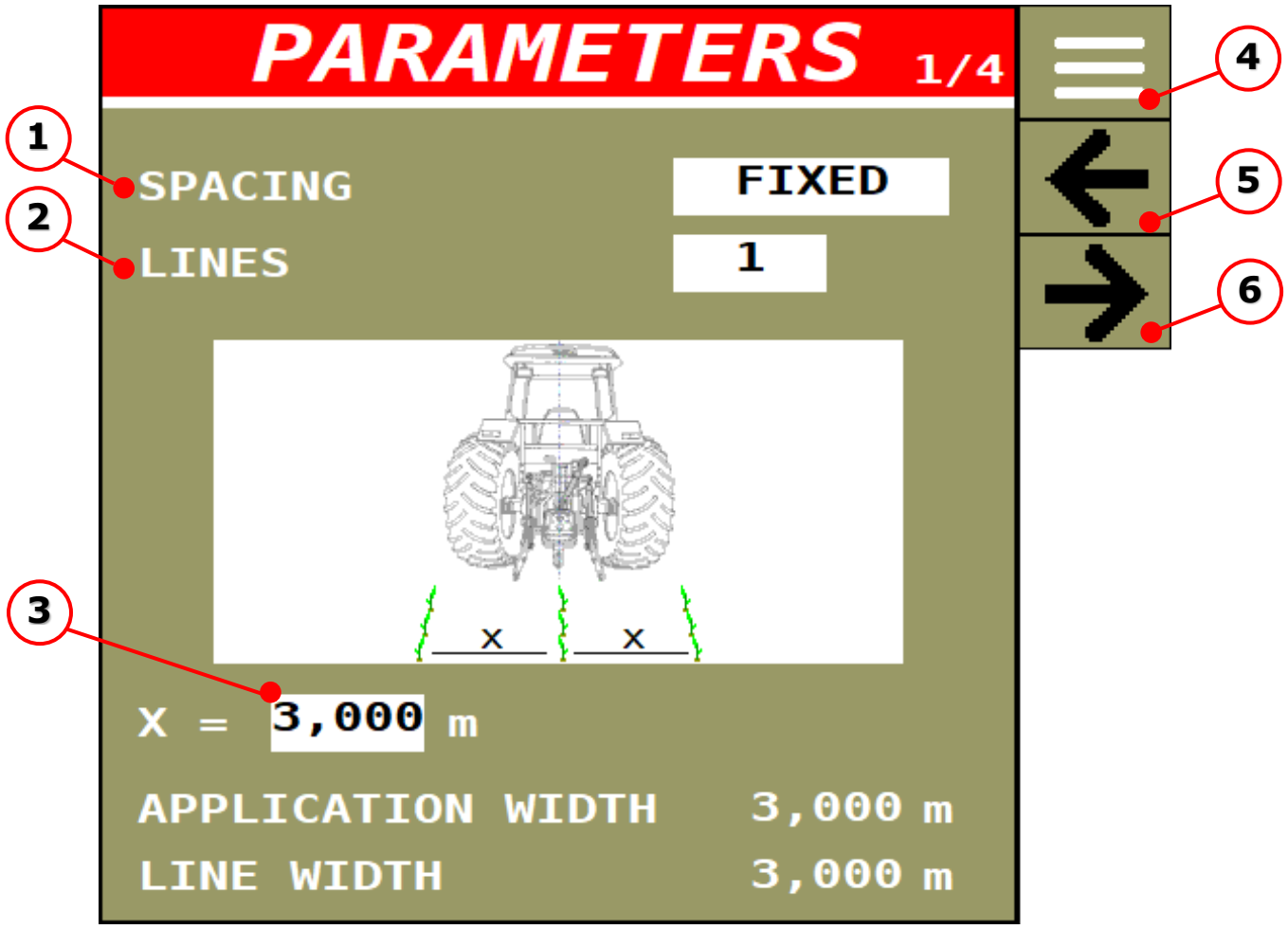
Configurations Screen



Pos.	Description
1	Implement Settings
2	Channel 1 Settings
3	Channel 1 Calibration / Gauging
4	Channel 2 Settings
5	Channel 2 Calibration / Gauging
6	Home (Operations screen)
7	ECU Parameterization Screen
8	User Login
9	ISOBUS Diagnostics

01 Implement Settings

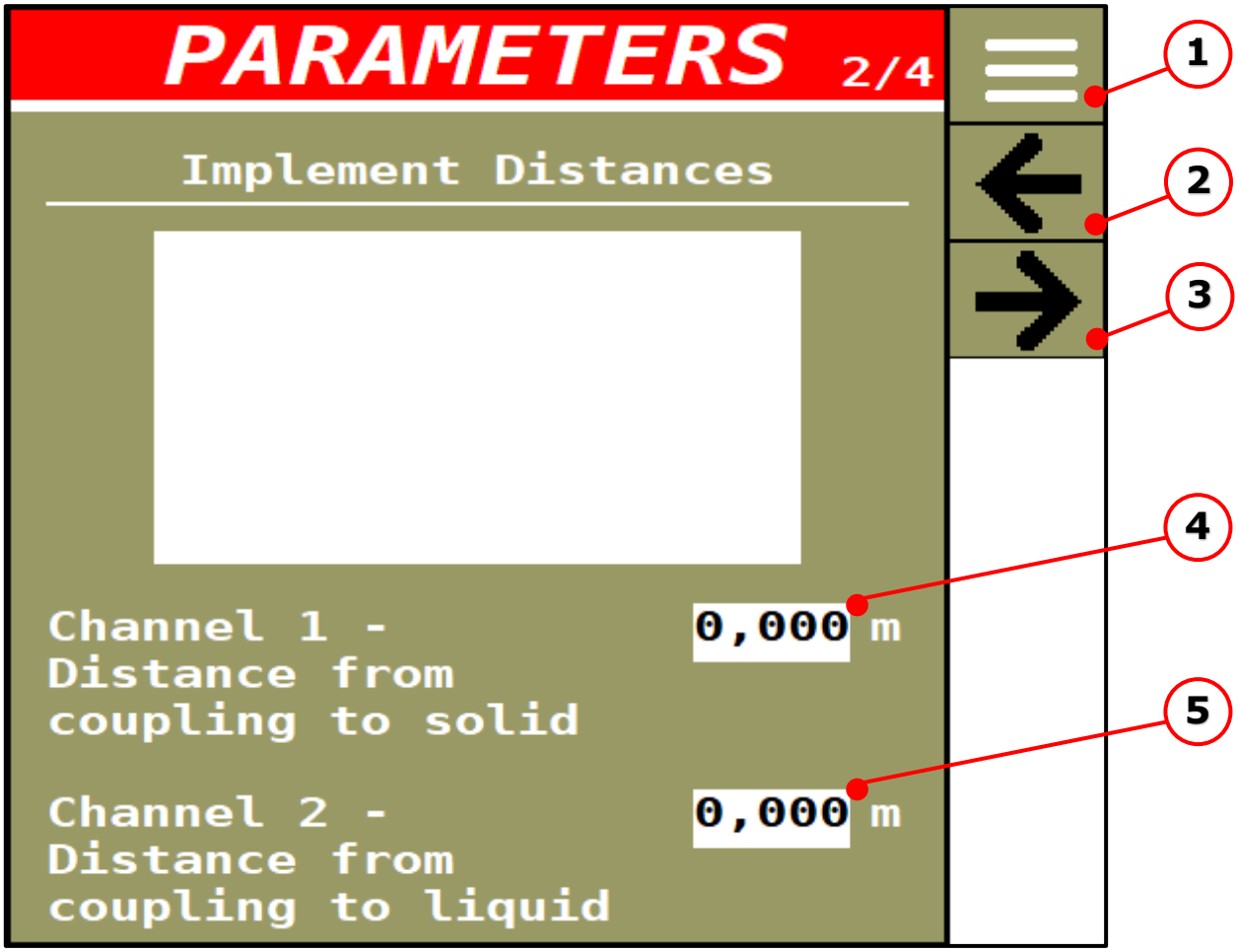
1/4



Pos.	Description
1	Spacing
2	Number of Lines
3	Width of Lines
4	Settings Screen
5	Page Navigation
6	Page Navigation

01 Implement Settings

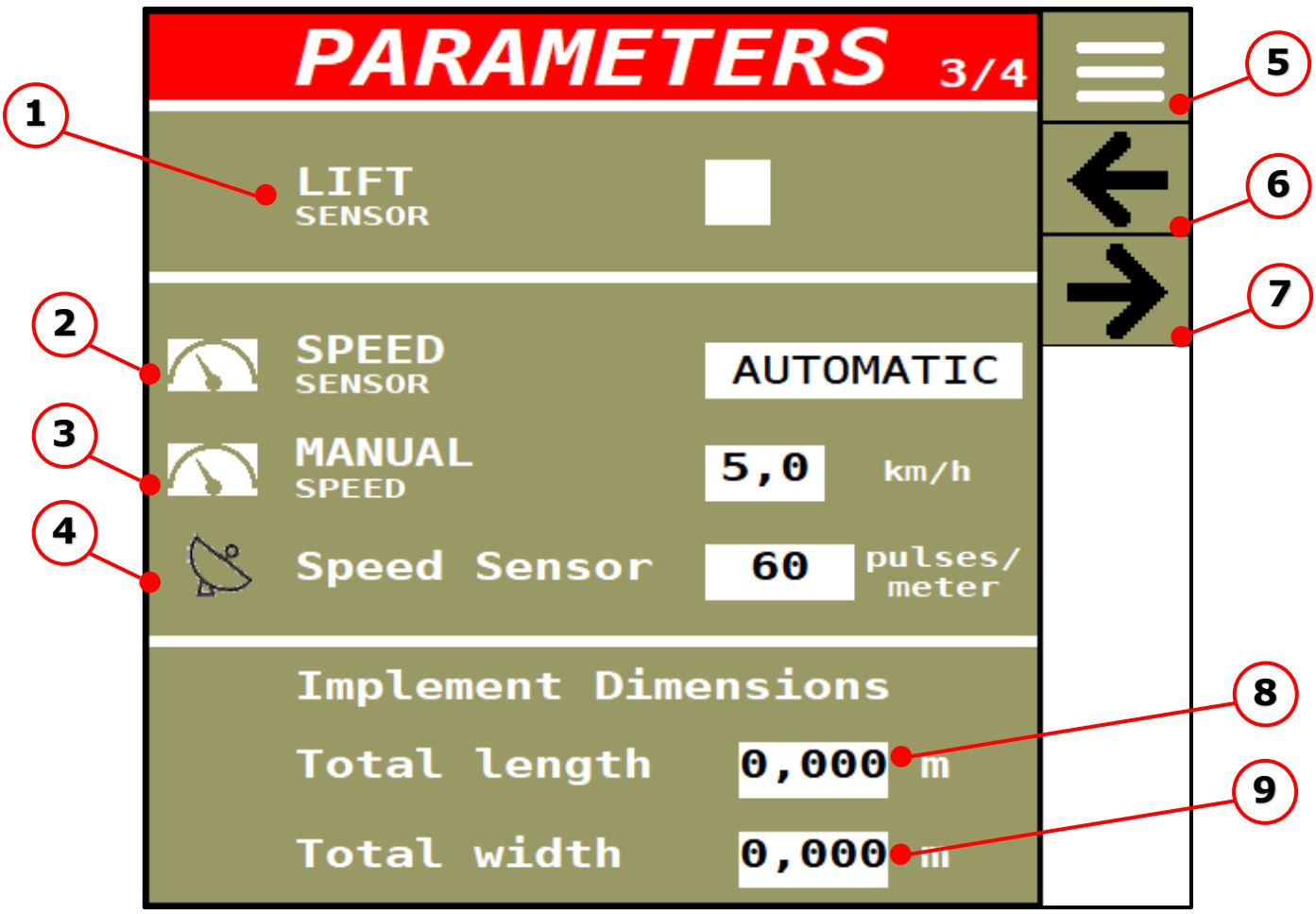
2/4



Pos.	Description
1	Settings Screen
2	Page Navigation
3	Page Navigation
4	Distance Channel 1
5	Distance Channel 2

01 Implement Settings

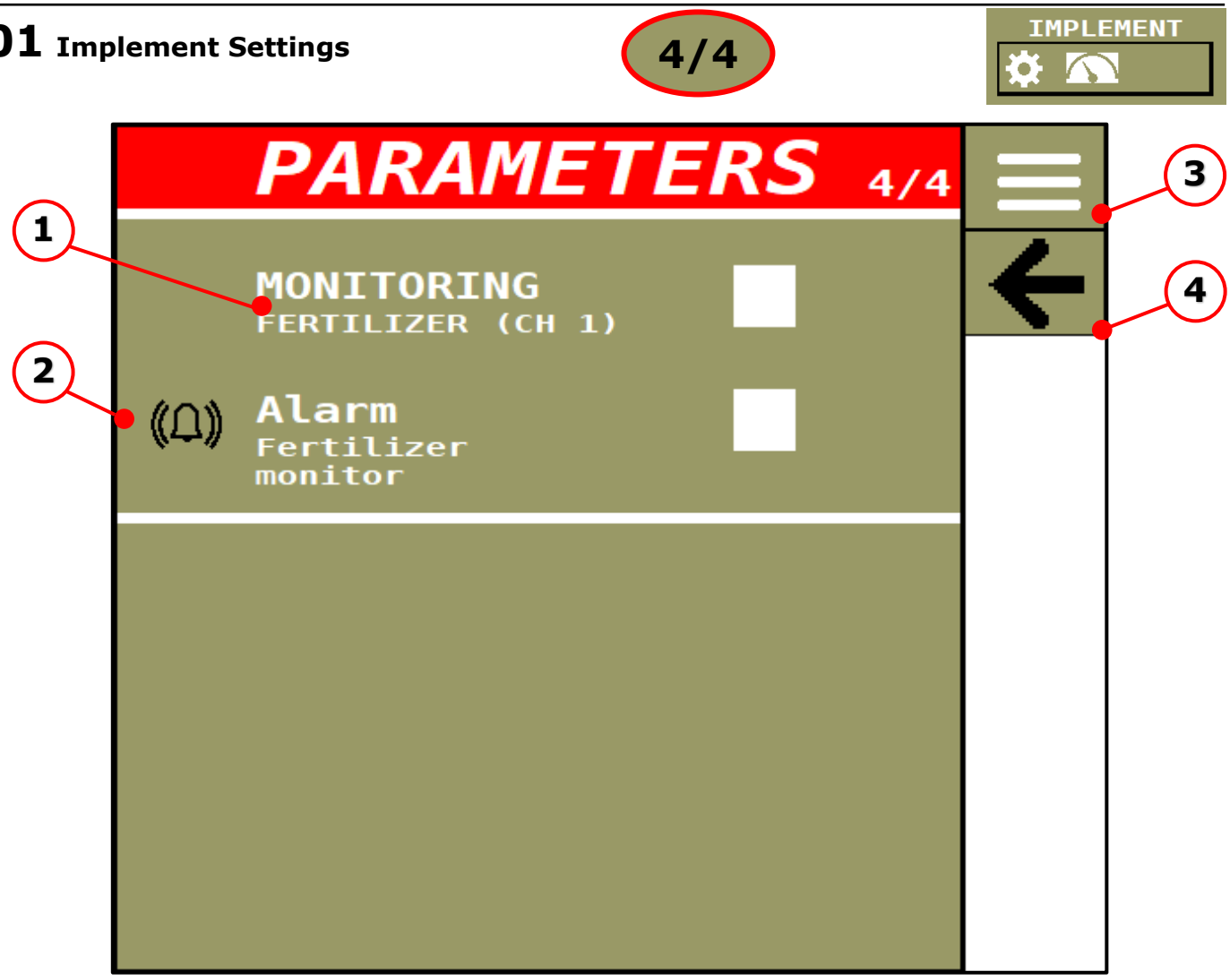
3/4



Pos.	Description
1	Enable / Disable Lift Sensor
2	Speed Sensor
3	SP for manual Speed
4	Pulses of Speed Sensor
5	Settings Screen
6	Page Navigation
7	Page Navigation
8	Total Length Implement
9	Total Width Implement

01 Implement Settings

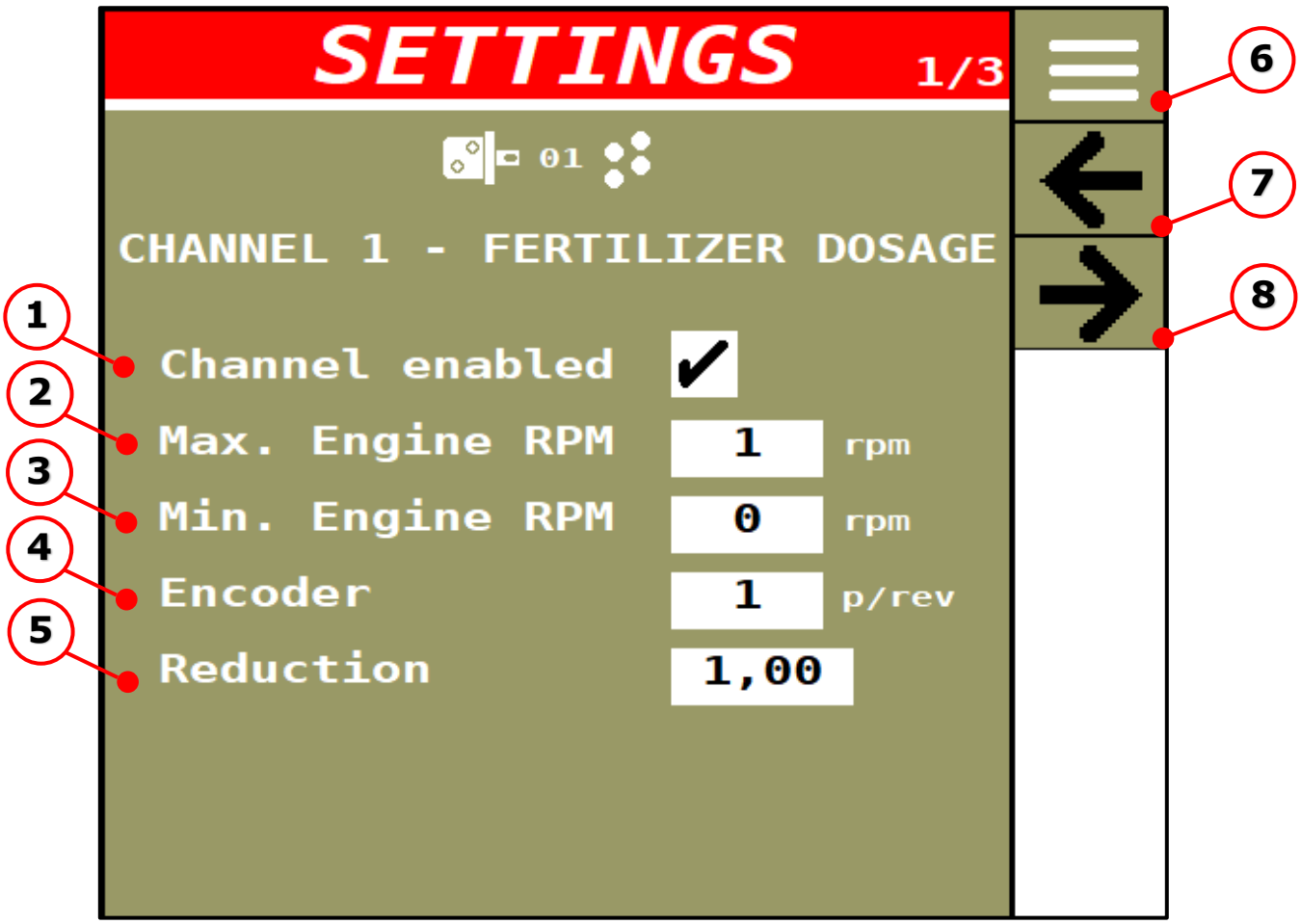
4/4



Pos.	Description
1	On/ Off Fertisensors
2	On / Off Fertisensors Alarm
3	Settings Screen
4	Page Navigation

02 Channel 1 Settings

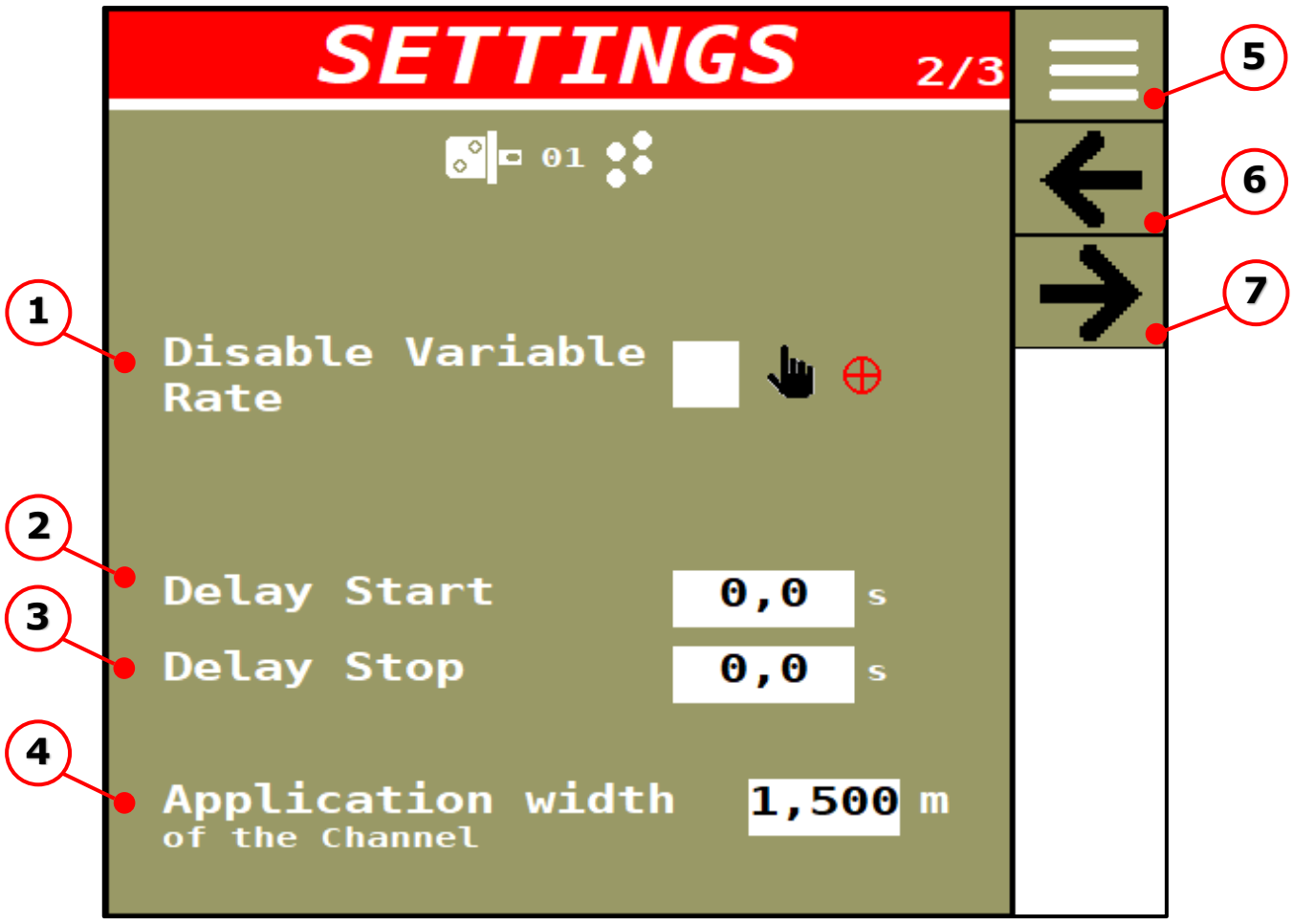
1/3



Pos.	Description
1	Enable / Disable Channel
2	Maximum engine rpm
3	Minimum engine rpm
4	Pulses of encoder
5	Mechanical reduction ratio
6	Settings Screen
7	Page Navigation
8	Page Navigation

02 Channel 1 Settings

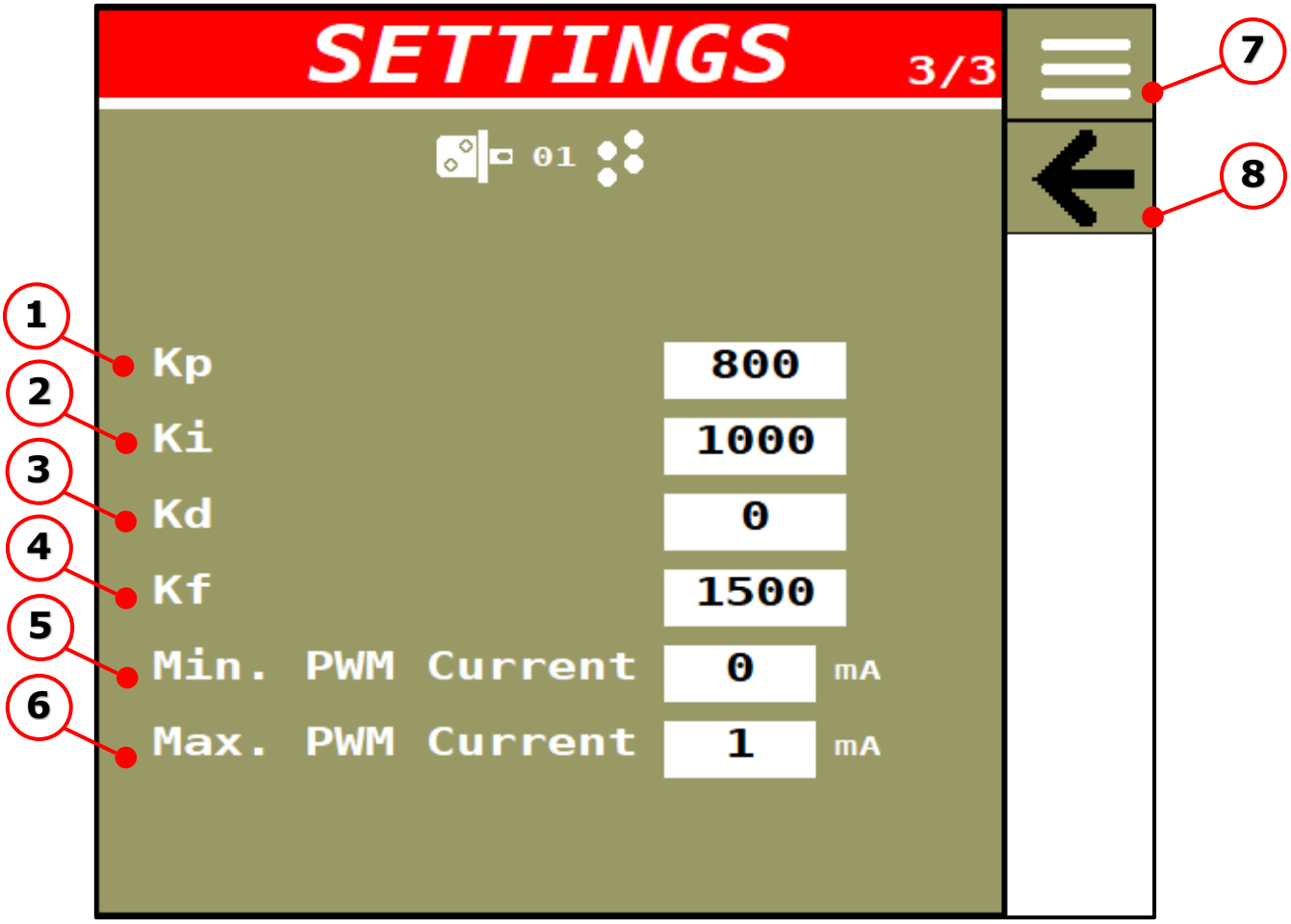
2/3



Pos.	Description
1	Disable Variable Rate
2	Delay Start (Section)
3	Delay Stop (Section)
4	Application Width
5	Settings Screen
6	Page Navigation
7	Page Navigation

02 Channel 1 Settings

3/3



Pos.	Description
1	**KP** channel PID proportional gain
2	**KI** channel PID integrative gain
3	**KD** channel PID derivative gain
4	**KF** channel PID feed-forward gain
5	Minimum opening current of hydraulic block solenoid
6	Maximum opening current of hydraulic block solenoid
7	Settings Screen
8	Page Navigation

- To adjust the PID parameters it is necessary someone who has experience to tune, but through the tips in this manual the user will have an idea of how to tune the gains:

  Kp Gain: The proportional action produces an output signal that is proportional to the error amplitude. Too high a proportional gain generates a high output signal, which can destabilize the system, but if the proportional gain is too low, the system fails to apply the necessary action to correct the disturbances.

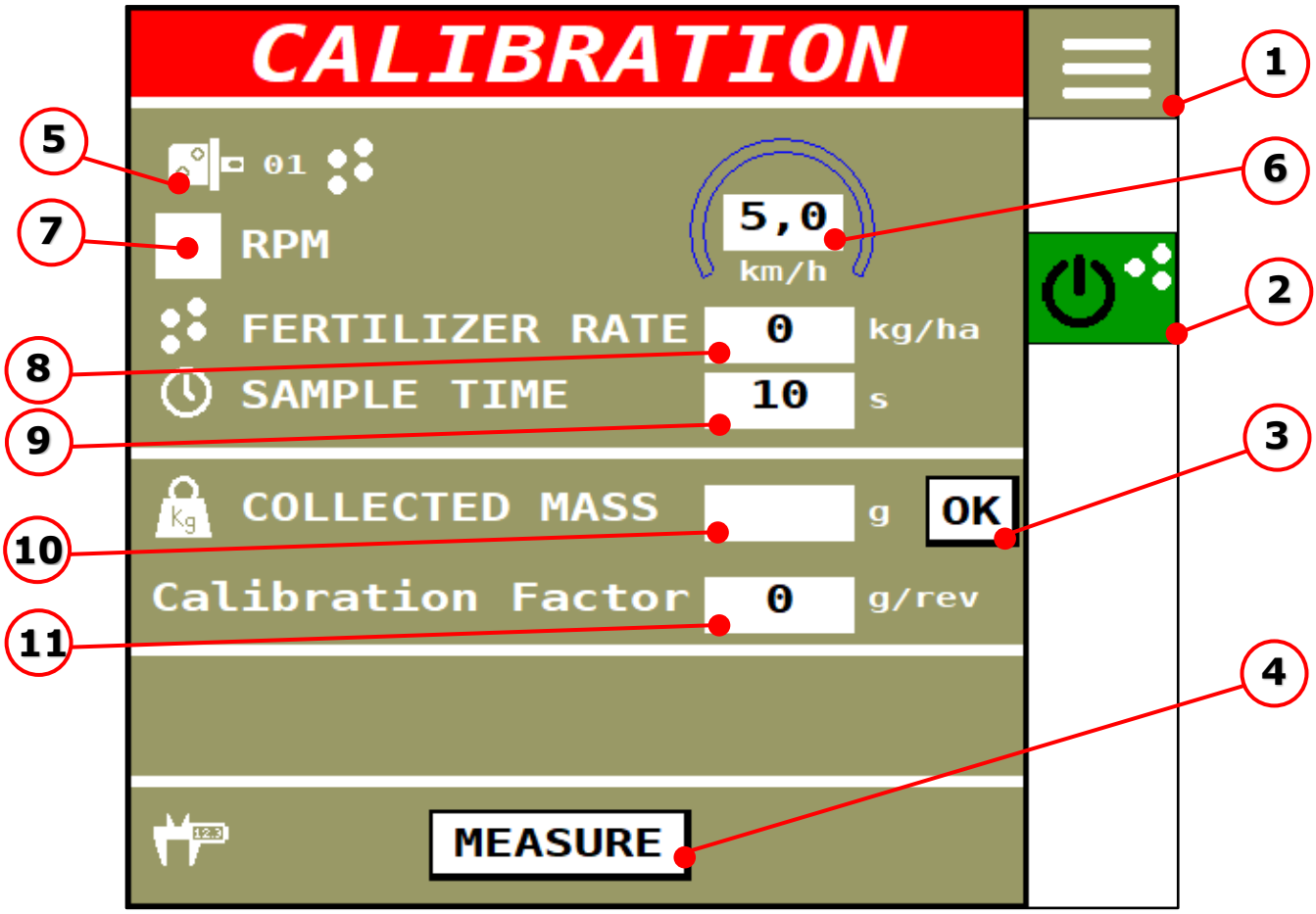
  Ki Gain: Integral action produces an output signal that is proportional to the magnitude and duration of the error, that is, the accumulated error. This provides an alternative to correcting the offset error generated by the proportional action and speeds up the system's response, allowing it to reach the set point more quickly. If the integral gain is low, the system may take a long time to reach the reference value. However, if the integral gain is too high, the system may become unstable.

  Kd gain: Derivative action produces an output signal that is proportional to the rate of change of the error, providing early error correction, decreasing response time and improving system stability. This indicates that the derivative action should not be used in processes in which the system must respond quickly to a disturbance, nor in processes that present a lot of noise in the measured signal, as it would lead the process to instability.

  Kf gain: The anticipated action produces an initial signal at the output used to anticipate the error that can be produced by the system at the beginning of the operation.

As for the minimum and maximum opening currents of the solenoid valve, it is recommended to look at the performance chart provided by the manufacturer.

03 Channel 1 Calibration



Pos.	Description
1	Settings Screen
2	Calibration START/STOP
3	OK button for calculating the calibration factor after entering the amount of adduct that was weighed per line during calibration
4	Measuring the fertilizer calibration
5	Channel number that is being calibrated
6	Manual speed chosen to calibrate the fertilizer
7	Rpm Mode
8	Rate Fertilizer
9	Calibration sample time
10	Fertilizer Collected Mass
11	Calibration Factor

There are two types of fertilizer calibration:

- **Calibration by average RPM;**
- **Job calibration by the average rate and speed used for the operation.**

The first fertilizer calibration of the machine is recommended to be carried out with the correct "RPM" (7) function, which is nothing more than the average rpm between the minimum and maximum informed during channel configuration.

This is necessary so that a first calibration factor in grams/revolution is calculated so that the system can have a non-zero constant for the calculations.

To perform this first calibration, the user must follow these steps:

1. Select the "RPM" function (7);
2. Enter sample time (minimum 60 seconds recommended;
3. Place a container below the line(s) you want to consider in the calibration;
4. Press START (2);
5. Wait for the calibration to finish;
6. Weigh with a precision scale how much fell in "grams" on the line(s) - if you have weighed more than one line, add the weight of all and divide by the line number, in order to obtain the average "grams";
7. Enter the average weight collected per line in "grams" on the screen;
8. Press the "OK" button (3) so that the calibration factor is calculated and appears on the screen.

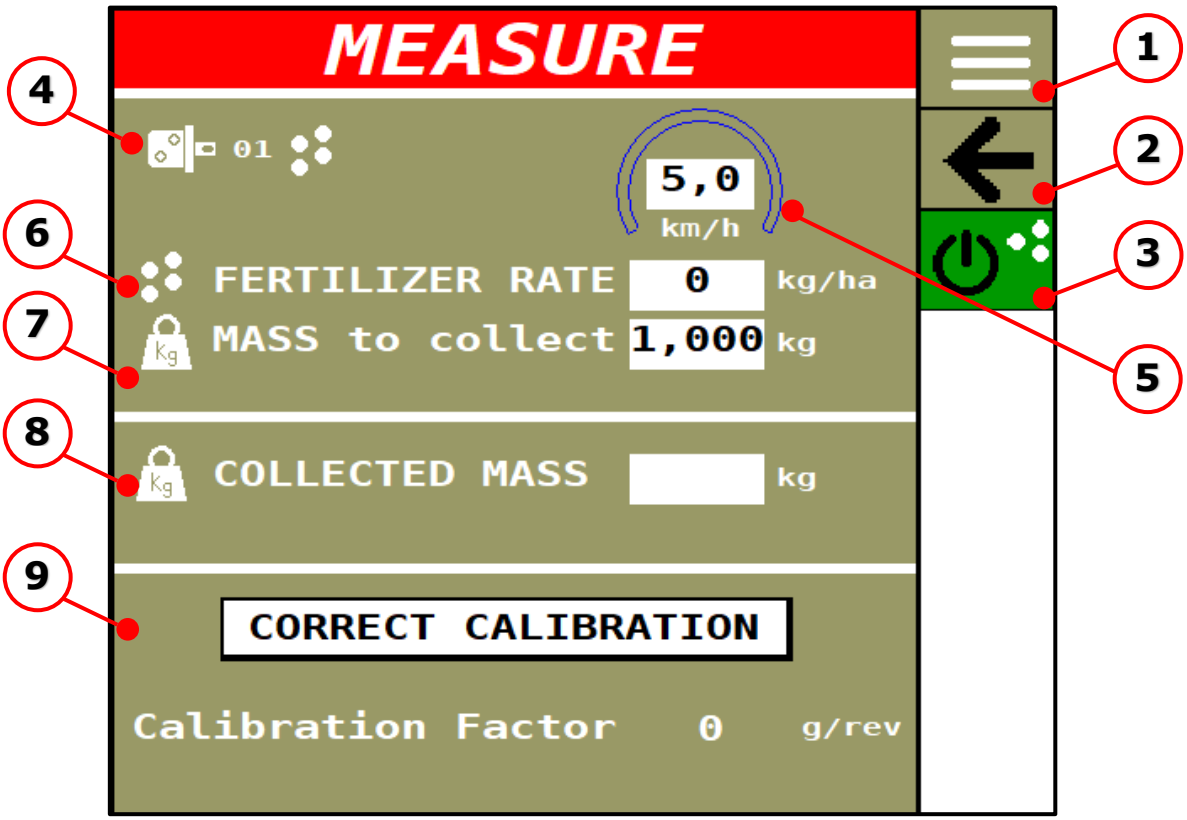
To perform the job calibration, the user must uncheck the "RPM" function (7), mentioned above, and follow the steps below:Inserir a taxa e velocidade médias de trabalho para a operação;

1. Enter the sample time (minimum 60 seconds recommended);
2. Place a container below the line(s) you want to consider in the calibration;
3. Press START (2);
4. Wait for the calibration to finish;
5. Weigh with a precision scale how much fell in "grams" on the line(s) - if you have weighed more than one line, add the weight of all and divide by the line number, in order to obtain the average "grams";
6. Enter the average weight collected per line in "grams" on the screen;
7. Press the "OK" button (3) so that the calibration factor is calculated and appears on the screen.

The user must perform this calibration at least 03 times in the first use of the system so that the calibration factor is calculated as close as possible to the real one.

There is also the option of directly entering the calibration factor in grams/lap if the user has already calculated it. Just click on the "calibration factor" field (11) and enter the value manually.

04 Channel 1 Measure



Pos.	Description
1	Settings Screen
2	Page Navigation
3	START/STOP Measure
4	Channel number that is being calibrated
5	Manual speed chosen to calibrate the fertilizer
6	Rate Fertilizer
7	Mass to Collect
8	Fertilizer Collected Mass
9	Calibration Factor

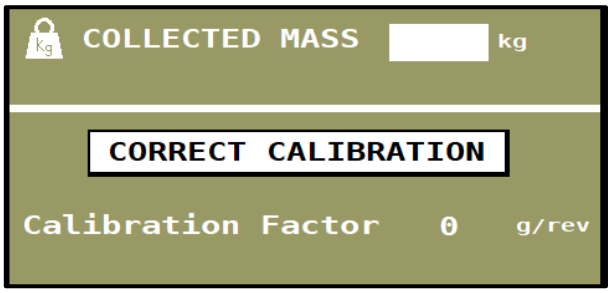
04 Channel 1 Measure

In the measurement, the user must enter the weight to be collected at the end of the measurement, the measurement ends when the system doses the desired weight in the container.

After starting the operation, the motor(s) automatically stop at the end of the procedure.

If the weight dosed during the measurement is relatively the same as the value entered, it means that the system is correctly calculating the dosage.

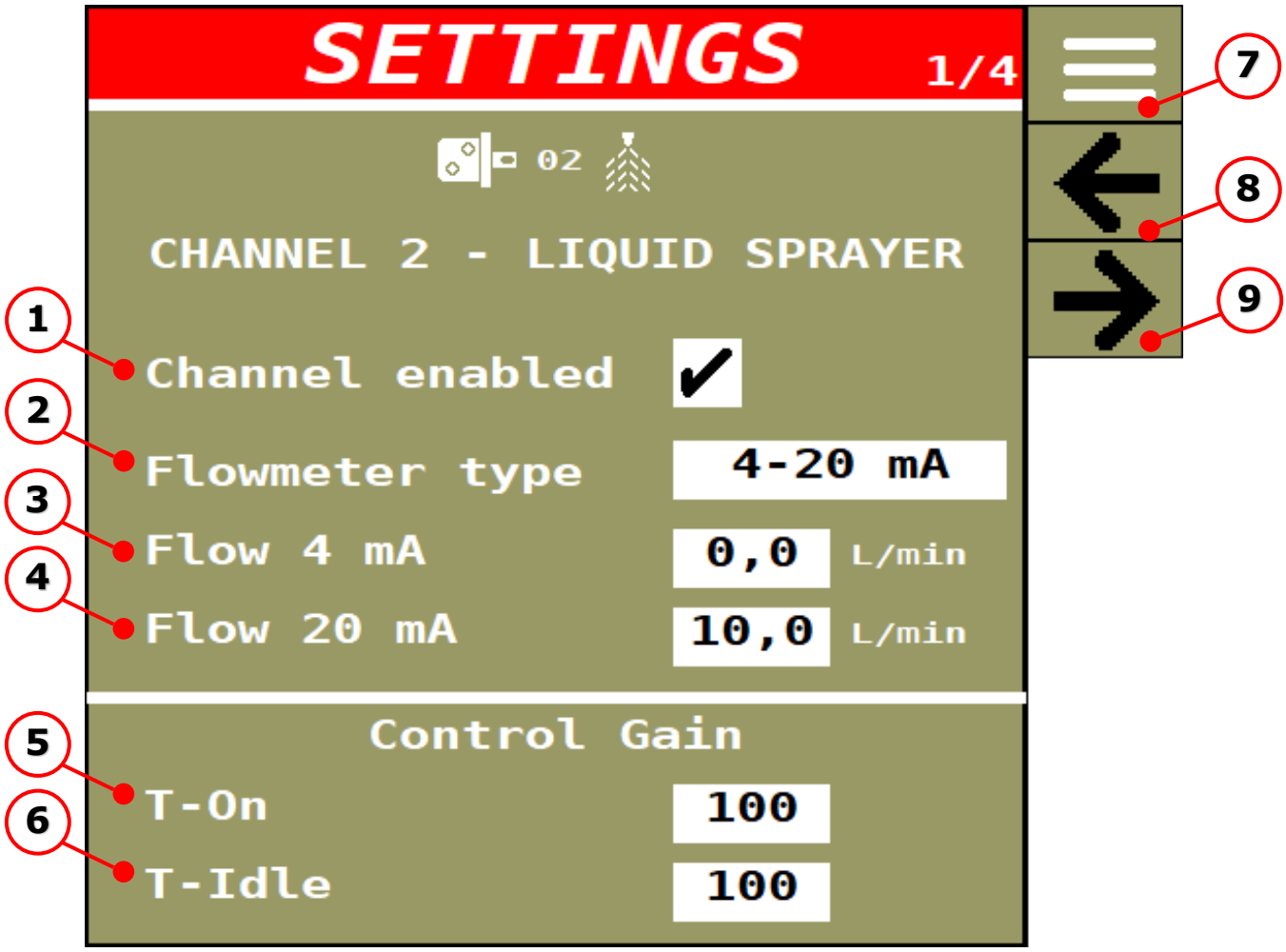
If there is a significant difference between the weight collected by the user and the weight to be collected, the user must enter the value of the weight collected in the corresponding field, press the correct calibration button so that the system adjusts the g/rev factor.



If necessary, redo the gauging procedure again.

05 Channel 2 Settings

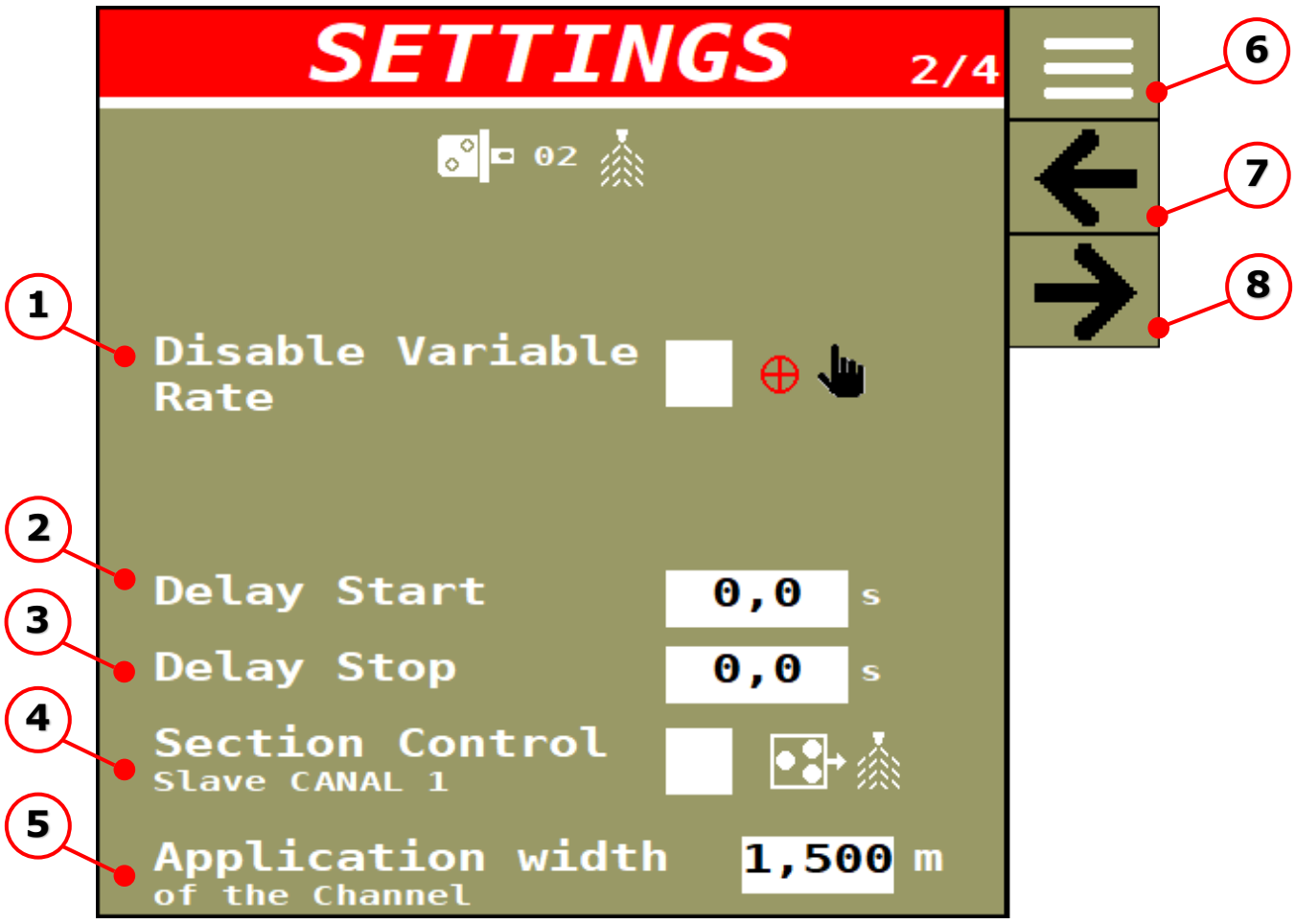
1/4



Pos.	Description
1	Enable / Disable Channel
2	Flowmeter Type
3	Maximum Flow
4	Minimum Flow
5	Valve On Time
6	Valve Idle Time
7	Settings Screen
8	Page Navigation
9	Page Navigation

05 Channel 2 Settings

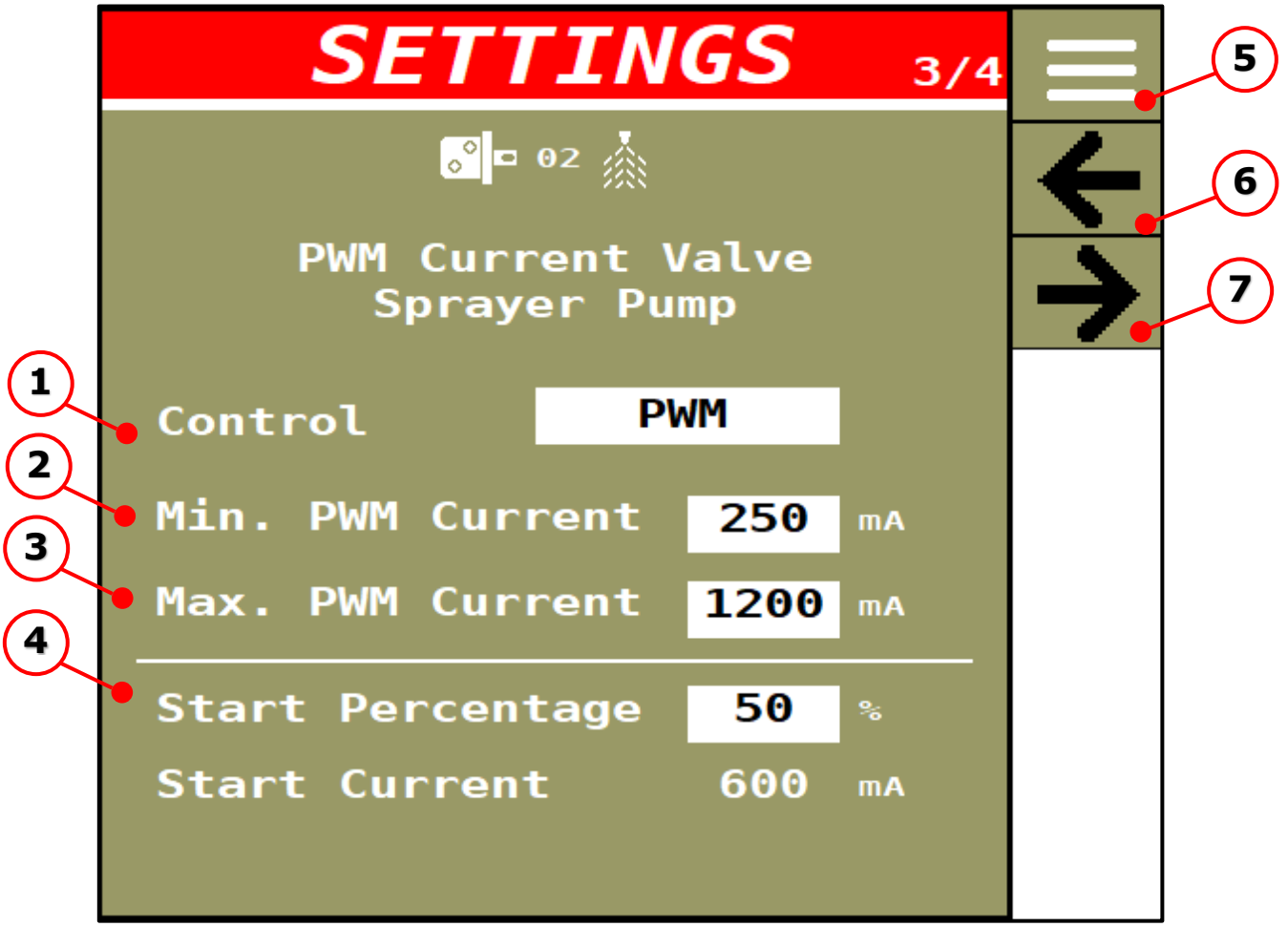
2/4



Pos.	Description
1	Disable Variable Rate
2	Delay Start (Section)
3	Delay Stop (Section)
4	Enable Section slave Channel 1
5	Application Width
6	Settings Screen
7	Page Navigation
8	Page Navigation

05 Channel 2 Settings

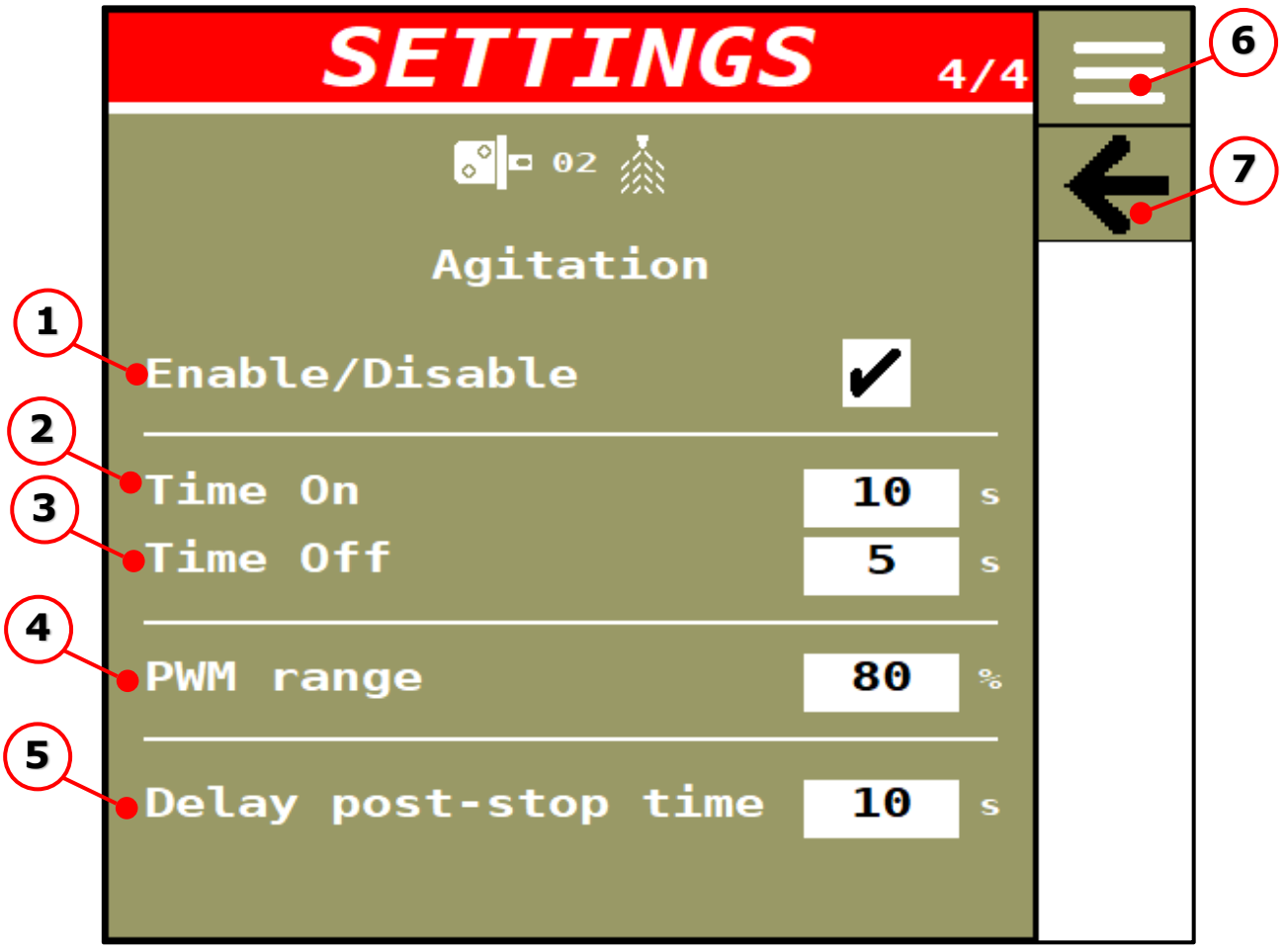
3/4



Pos.	Description
1	Type of control for valve actuation (pump) Controle On/Off Controle PWM
2	Minimum valve current
3	Maximum valve current
4	Start Percentage Range (PWM)
5	Settings Screen
6	Page Navigation
7	Page Navigation

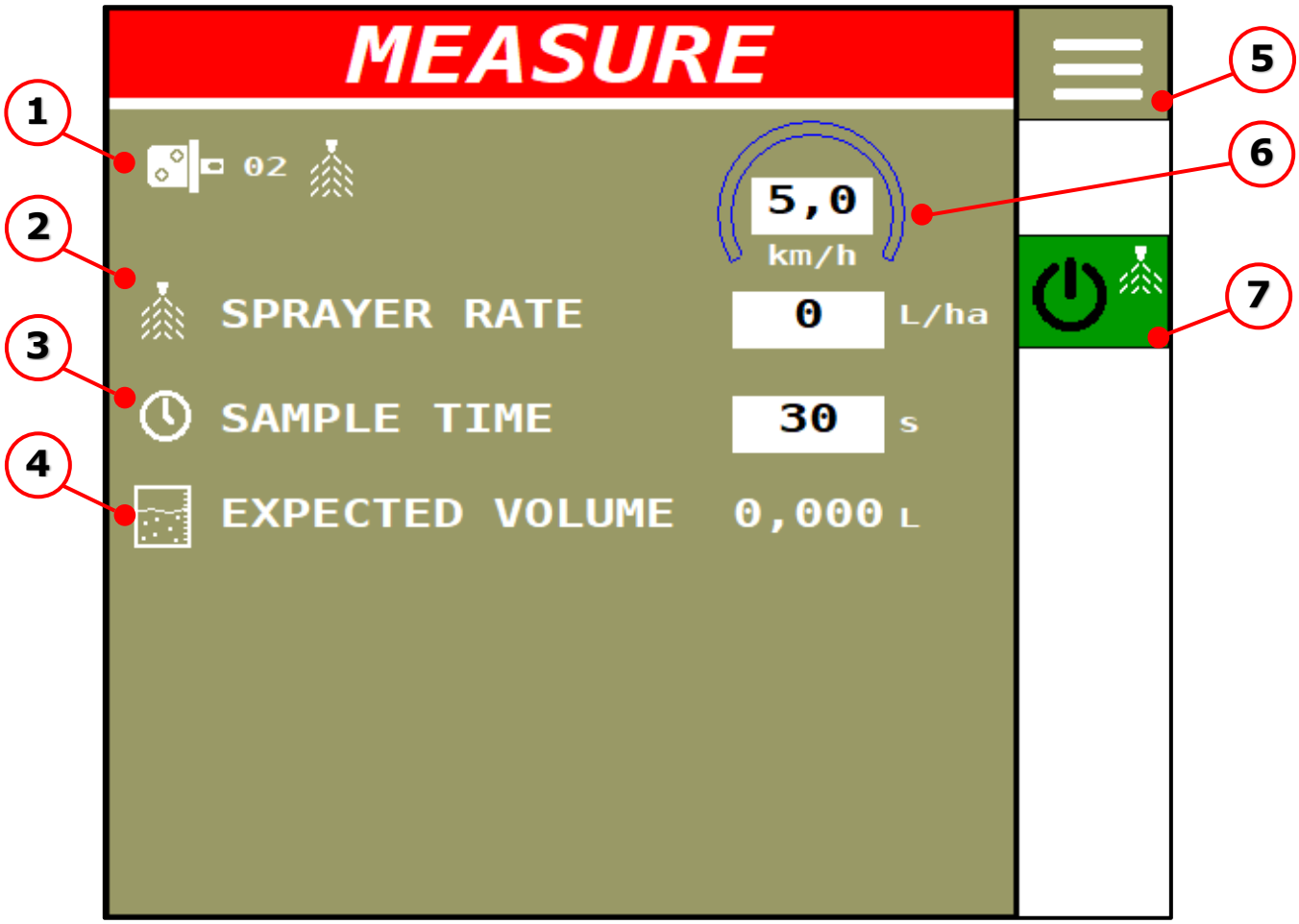
05 Channel 2 Settings

4/4



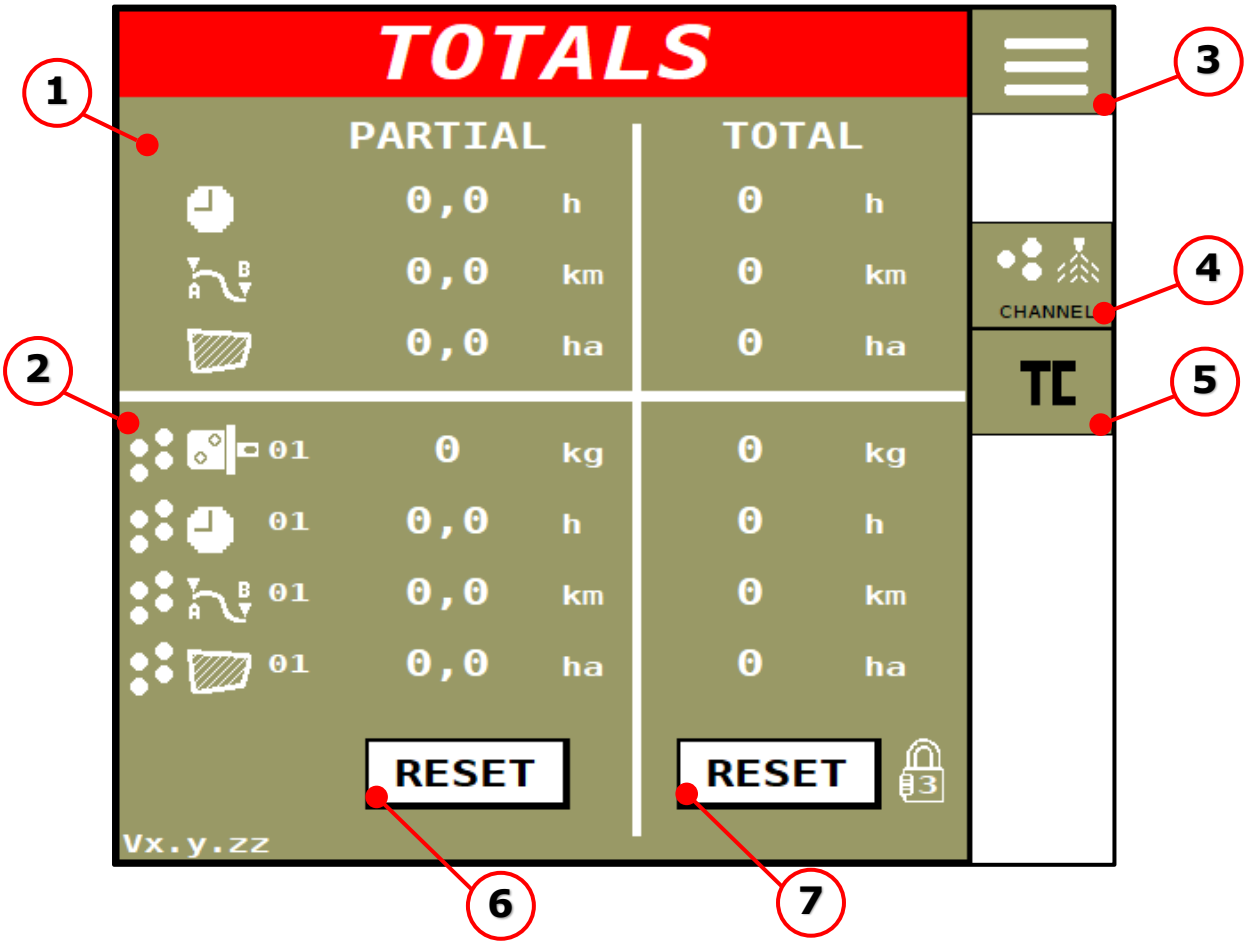
Pos.	Description
1	Enable / Disable Agitation
2	Cycle Time ON Agitation
3	Cycle Time OFF Agitation
4	Range (PWM)
5	Delay Pos STOP
6	Page Navigation

06 Channel 2 Settings



Pos.	Description
1	Channel number that is being checked
2	Rate Sprayer
3	Sample Time
4	Calculated volume (based on calculated flow in l/min * sample time)
5	Settings Screen
6	Manual speed you want to calibrate the fertilizer
7	START/STOP Measure

Totalizers

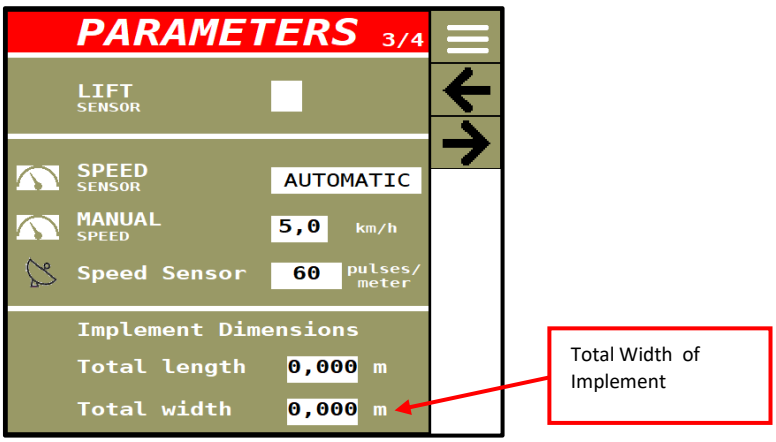


Pos.	Description
1	Total implement data
2	Total Channel data
3	Settings Screen
4	Change Channel
5	Totalization by Fixed Rate or Variable Rate
6	Reset Partial Totalized data (Operator)
7	Reset Partial Totalized data (Technical)

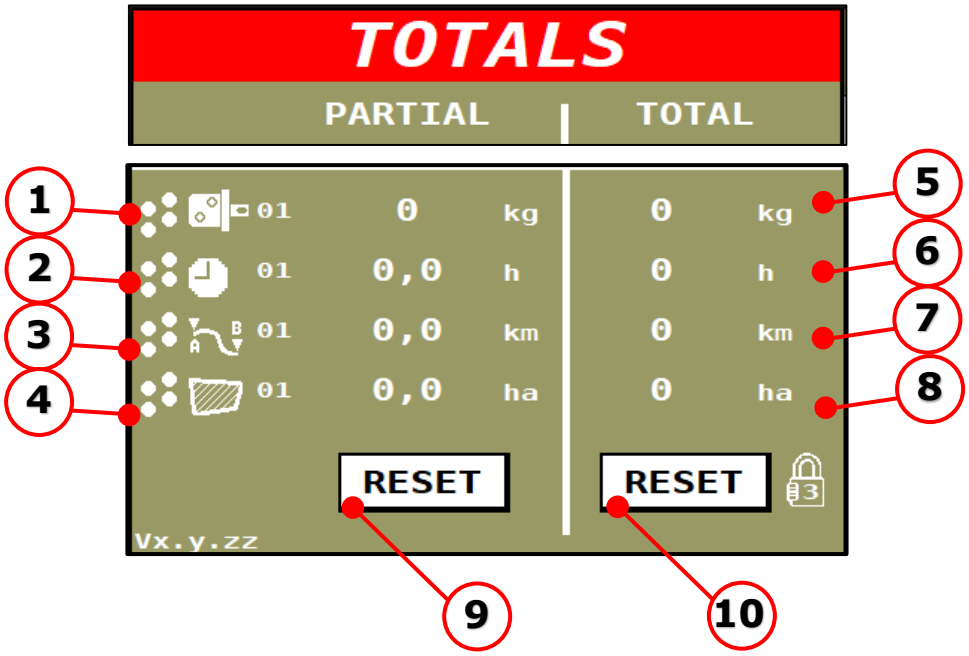
01 Total implement data

Pos.	Description
1	Totaled Part Hours of the Implement
2	Totalized partial km of the Implement
3	Totalized Partial Area of the Implement
4	Totaled Implement Hours
5	Totaled km of Implement
6	Totalized Area of the Implement

The base calculation data for implement totalizers are entered on the implement settings page.

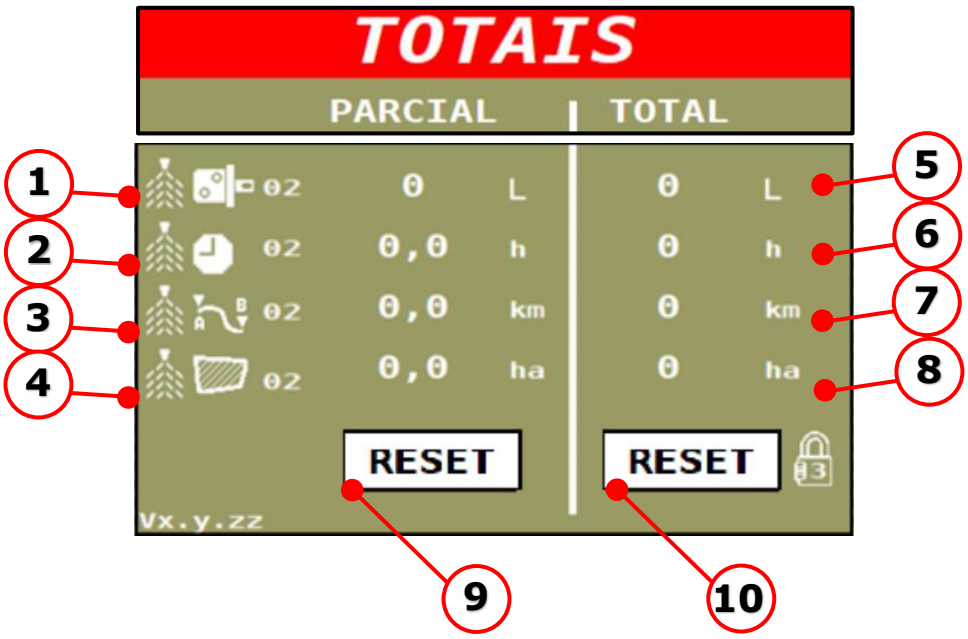


02 Total implement data Channel 01



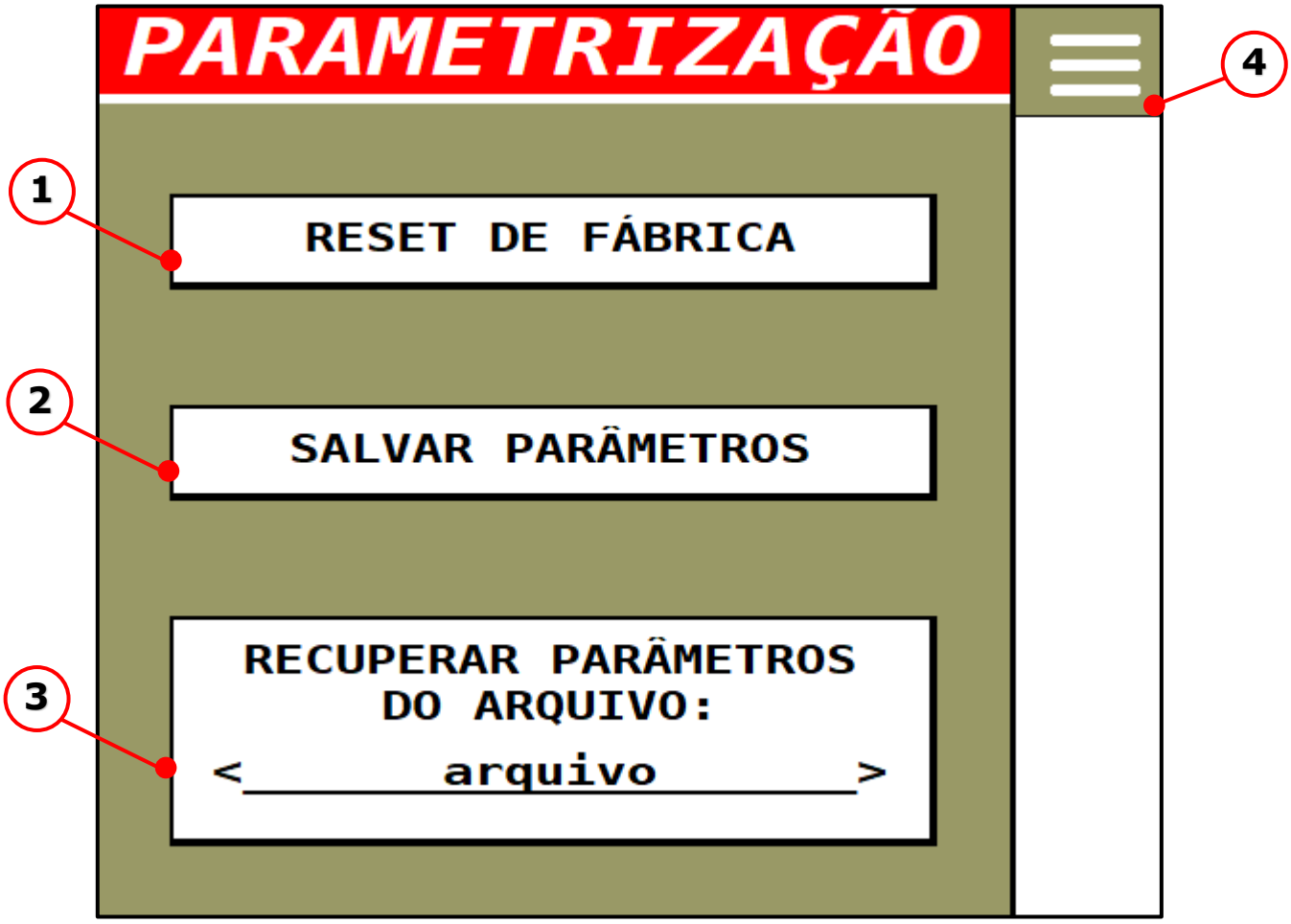
Pos.	Description
1	Totalized partial kilograms of the channel
2	Totaled Partial Hours of the channel
3	Totalized partial km of the channel
4	Totalized Partial Area of the channel
5	Totaled kilograms of the channel
6	Total channel hours
7	Totaled km of the channel
8	Total Area of the channel
9	Reset Partial Totalized data (Operator)
10	Reset Partial Totalized data (Technical)

02 Total implement data Channel 02



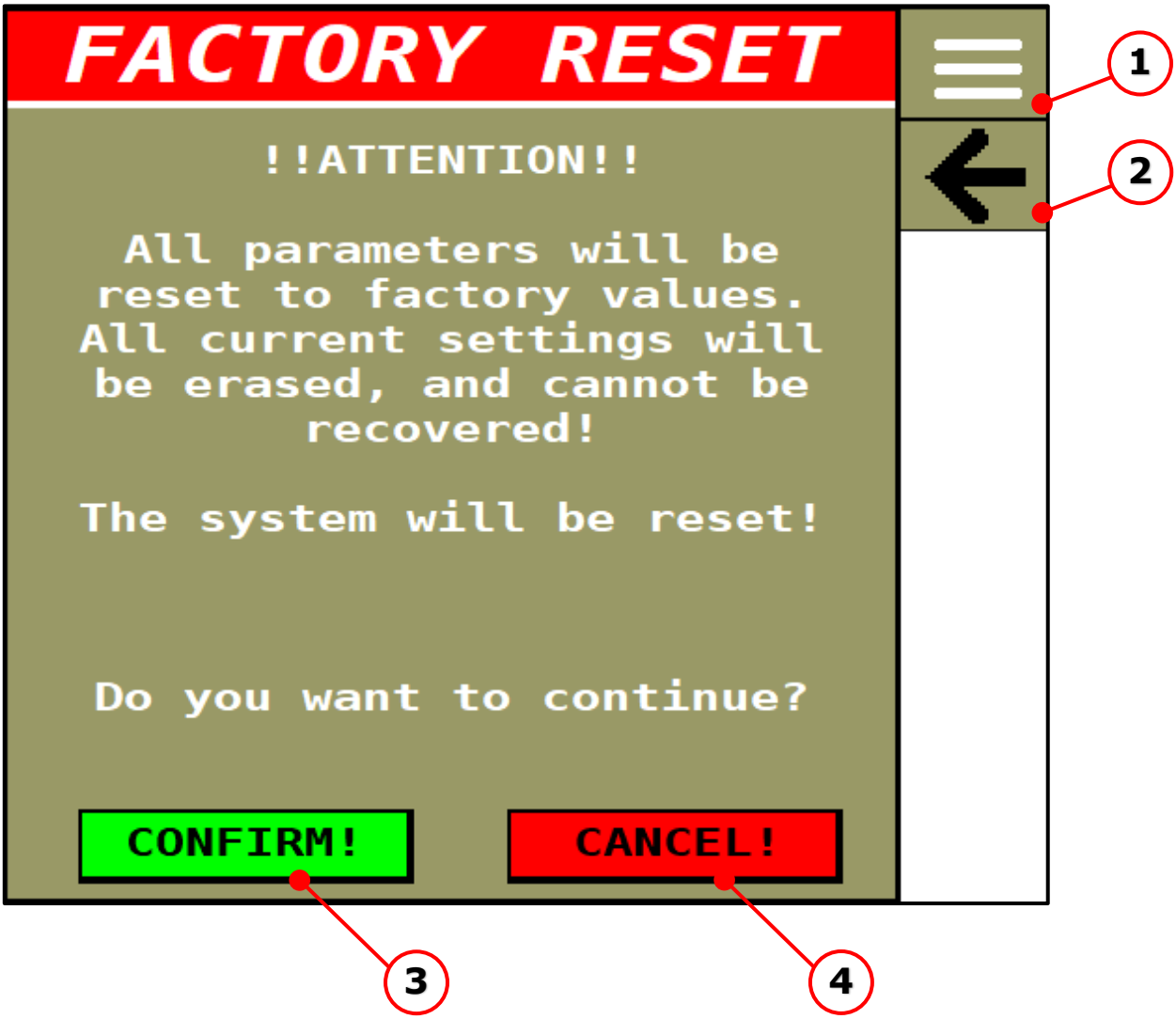
Pos.	Description
1	Totalized partial Liters of the channel
2	Totaled Partial Hours of the channel
3	Totalized partial km of the channel
4	Totalized Partial Area of the channel
5	Totaled Liters of the channel
6	Total channel hours
7	Totaled km of the channel
8	Total Area of the channel
9	Reset Partial Totalized data (Operator)
10	Reset Partial Totalized data (Technical)

ECU parameterization



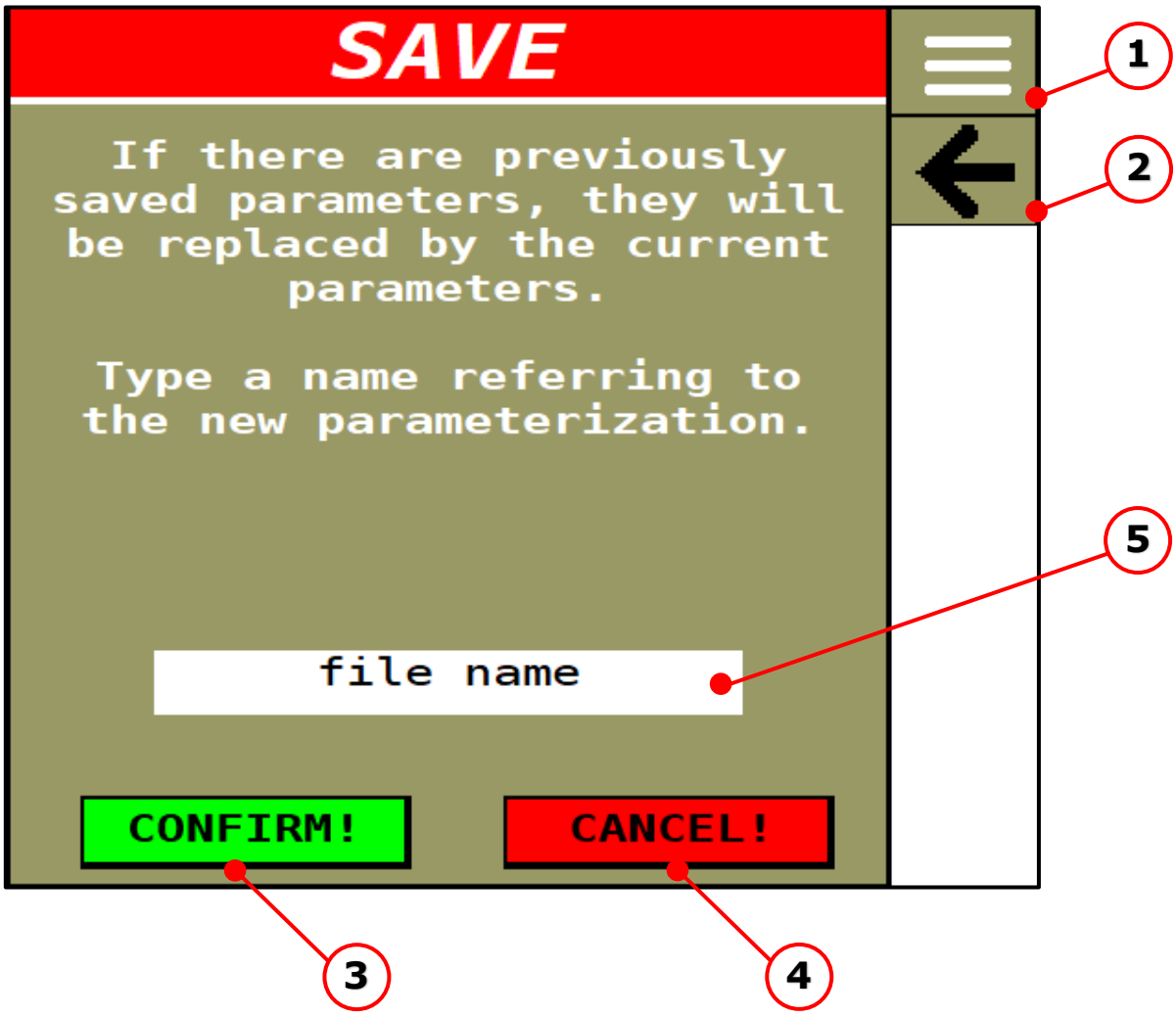
Pos.	Description
1	Factory Reset
2	Save parameters
3	Read parameters from File
4	Settings Screen

01 Factory Reset



Pos.	Description
1	Settings Screen
2	Page Navigation
3	Confirmar Reset
4	Cancel Reset

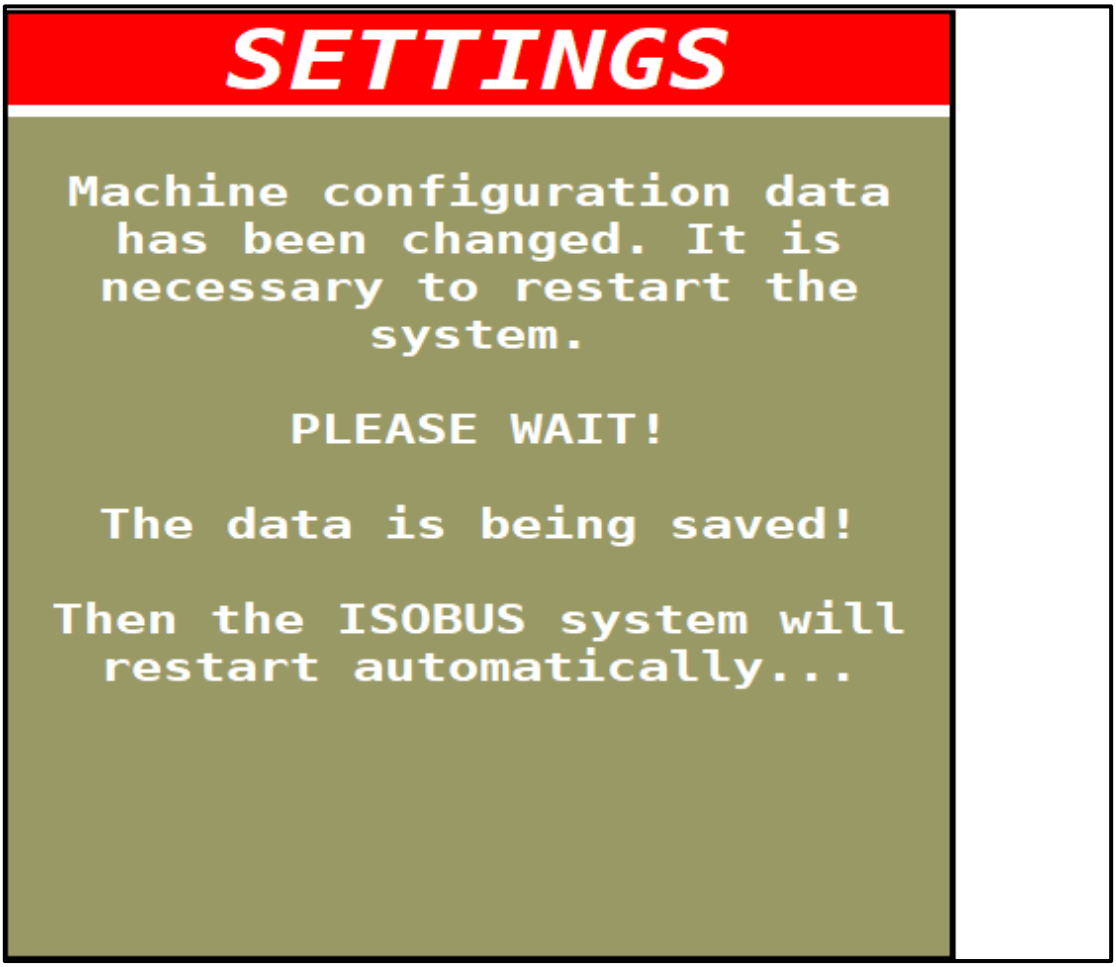
02 Save Parameters File



Pos.	Description
1	Settings Screen
2	Page Navigation
3	Confirm Save
4	Cancel
5	Enter name of File

03 Recover Parameters File

Pos.	Description
1	Settings Screen
2	Page Navigation
3	Confirm Recover
4	Cancel

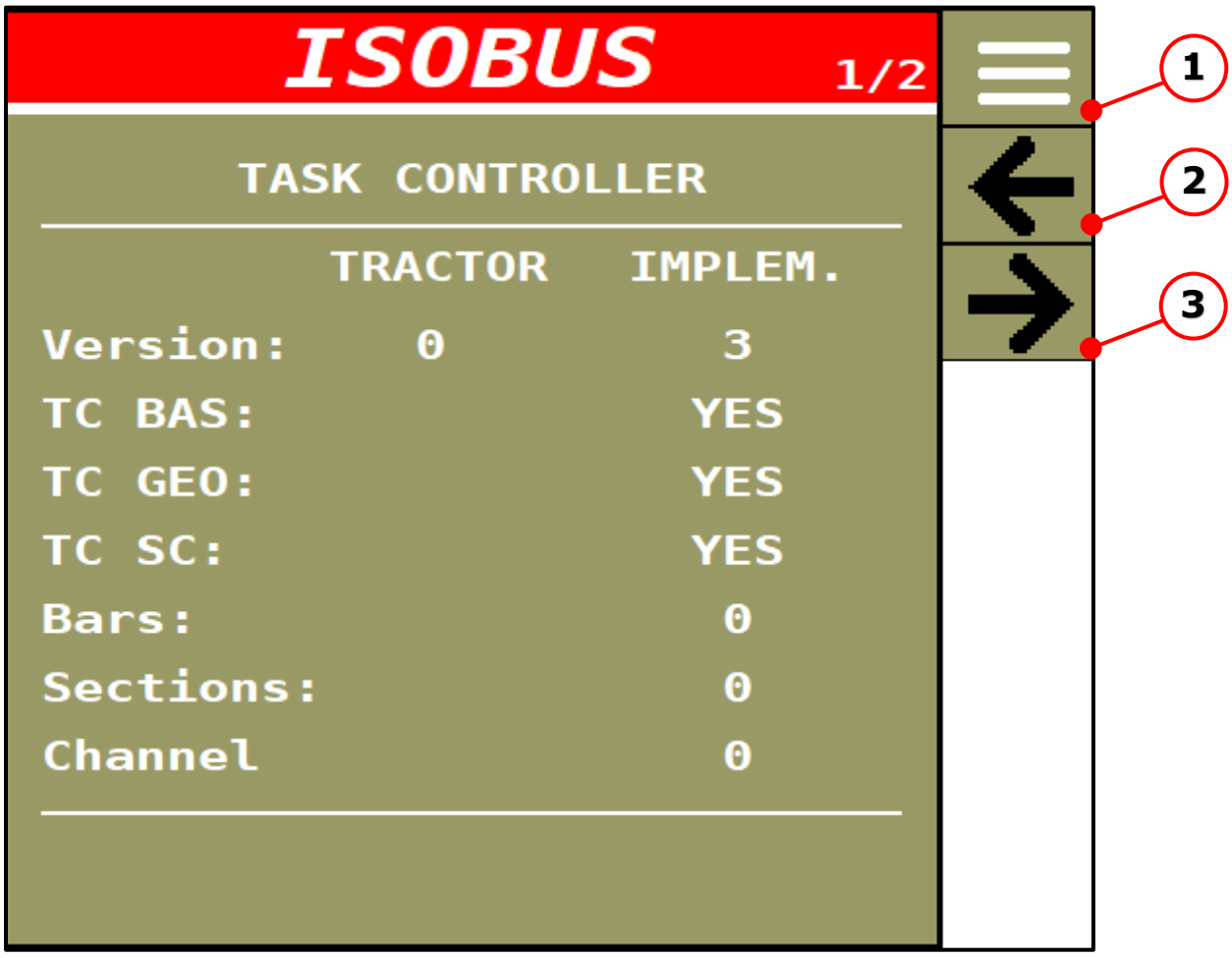

SETTINGS
Machine configuration data has been changed. It is necessary to restart the system.
PLEASE WAIT!
The data is being saved!
Then the ISOBUS system will restart automatically...

ISOBUS Diagnostics

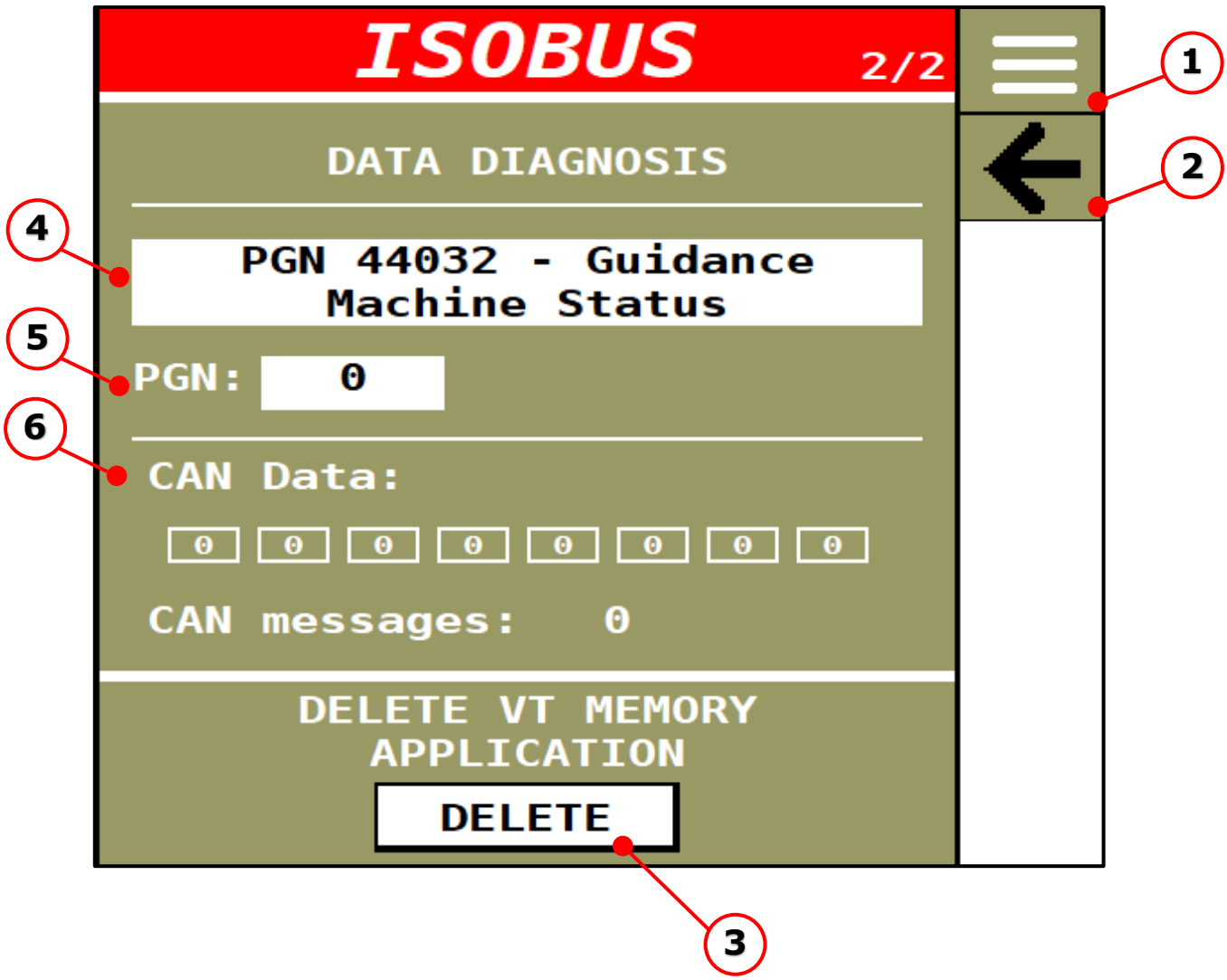
1/2

Data monitor
Tractor and implement ISOBUS information

- Version
- TC BAS
- TC GEO
- TC SC
- Bars
- Sections
- Channels



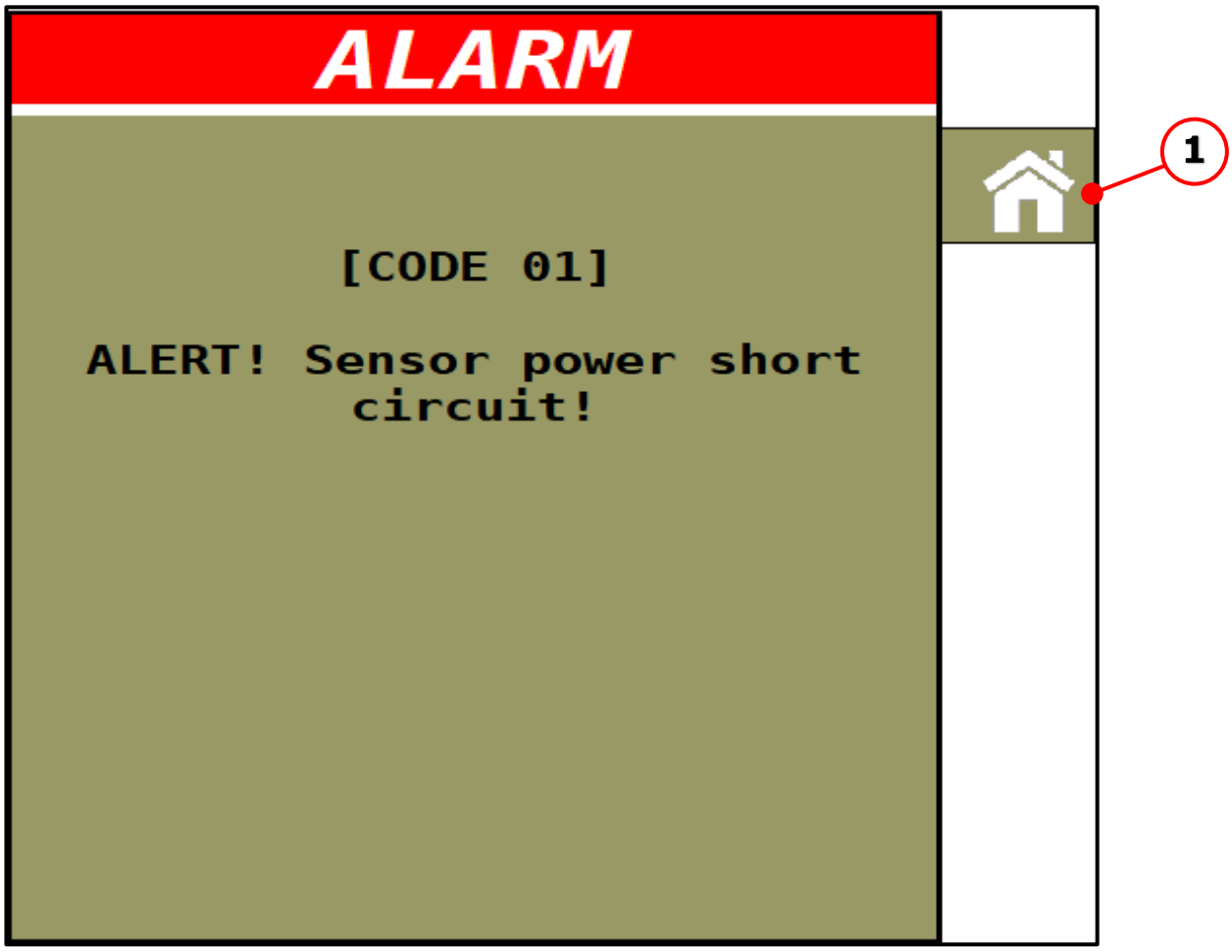
Pos.	Description
1	Settings Screen
2	Page Navigation
3	Page Navigation



Pos.	Description
1	Settings Screen
2	Page Navigation
3	Button to clear the memory of the graphic objects of the ISOBUS Terminal whenever indicated by the support area when there is a software version update
4	Indicates what the PGN that will be monitored on the ISOBUS bus is about
5	Enter the number of which PGN will be monitored on the ISOBUS bus
6	Shows the hexadecimal values of each byte of the inserted PGN CAN message

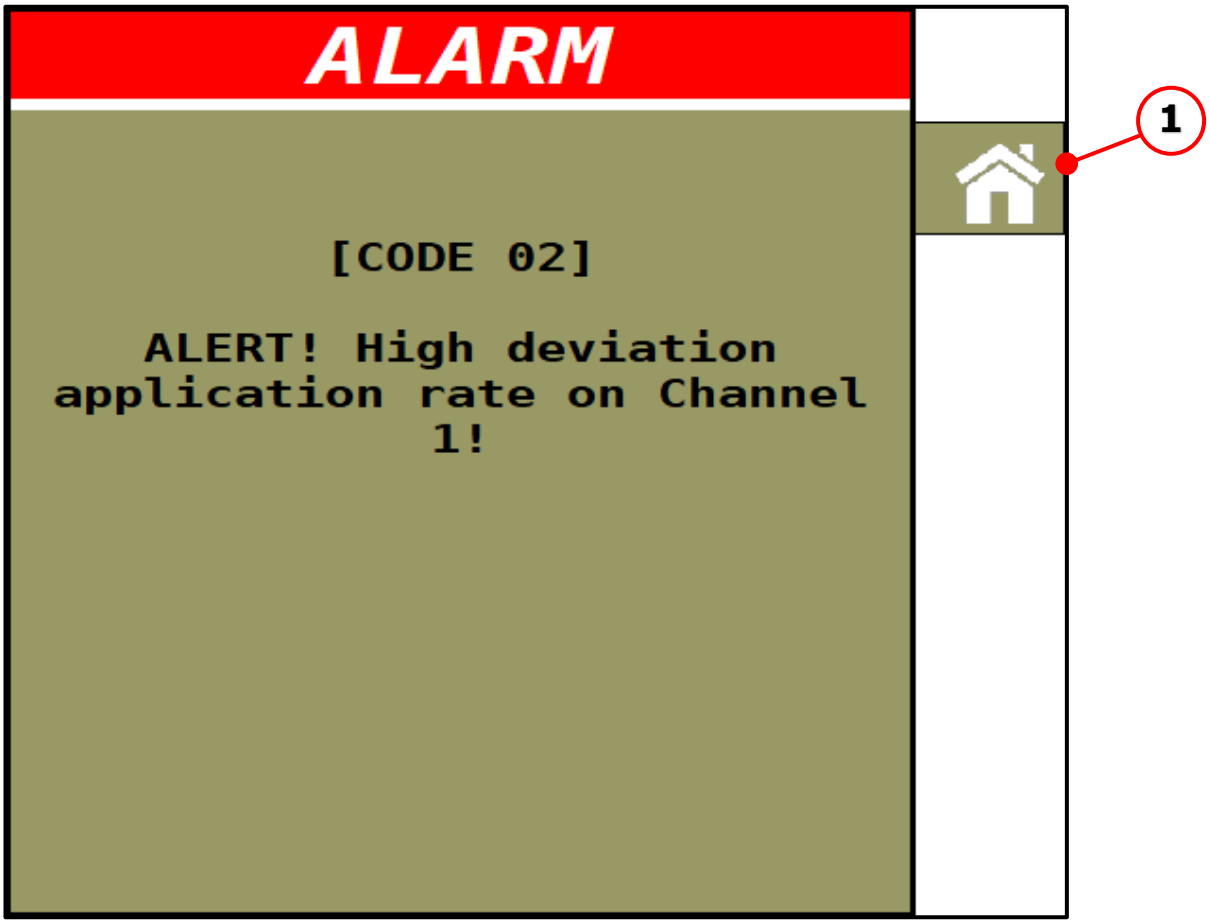
Alarms

Code 01 Sensor Power Short Circuit !



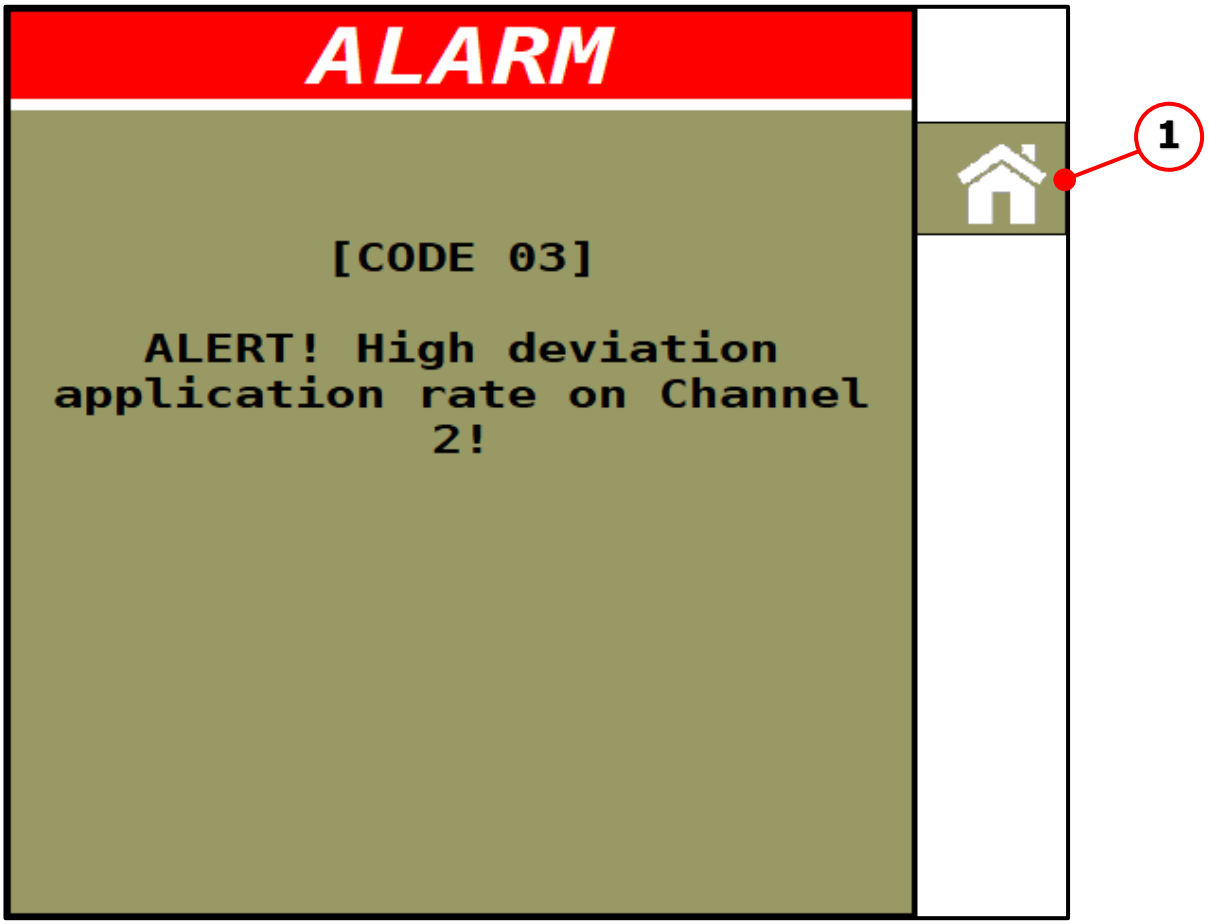
Pos.	Description
1	Operations Screen

Code 02 Application rate with high deviation channel 01 !



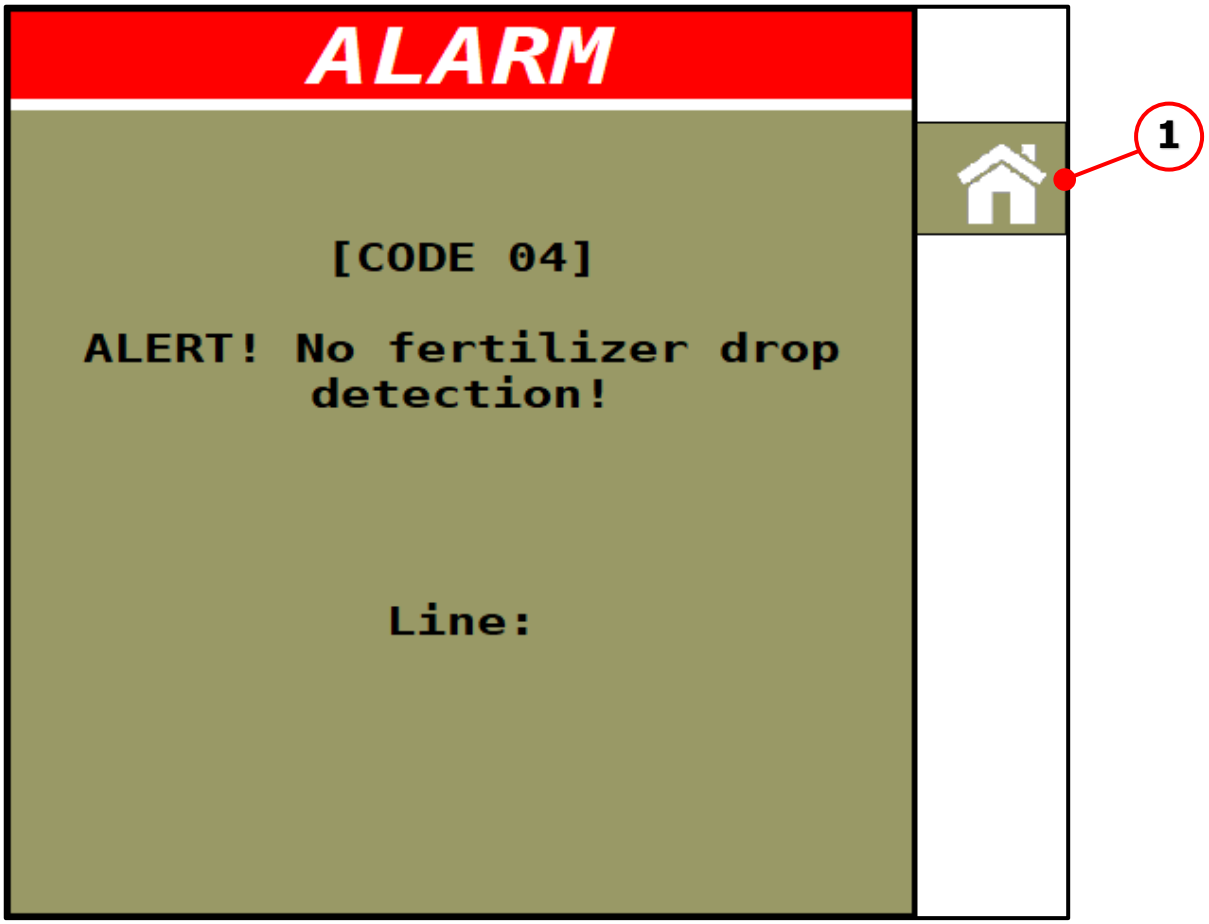
Pos.	Description
1	Operations Screen

Code 03 Application rate with high deviation channel 02 !



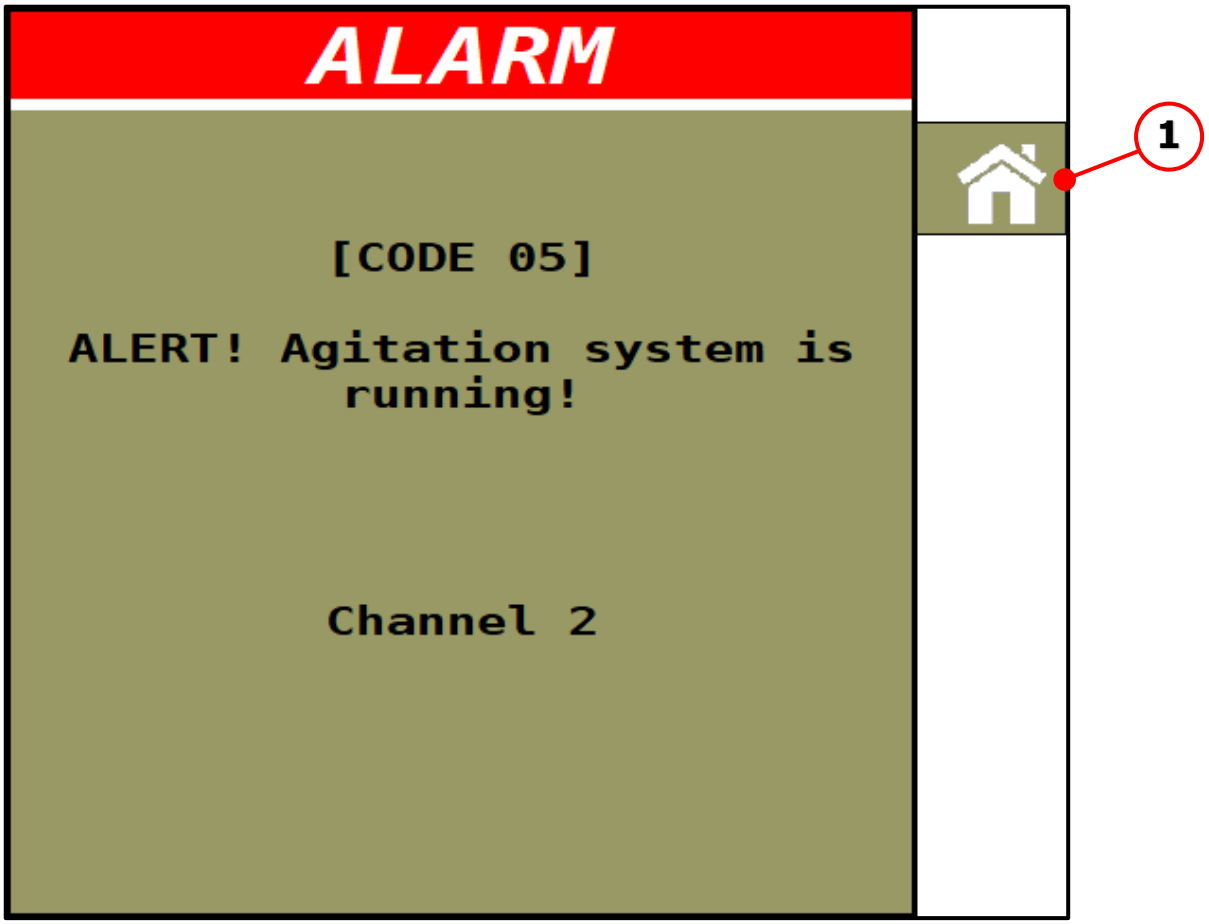
Pos.	Description
1	Operations Screen

Code 04 No Fertilizer drop detection !



Pos.	Description
1	Operations Screen

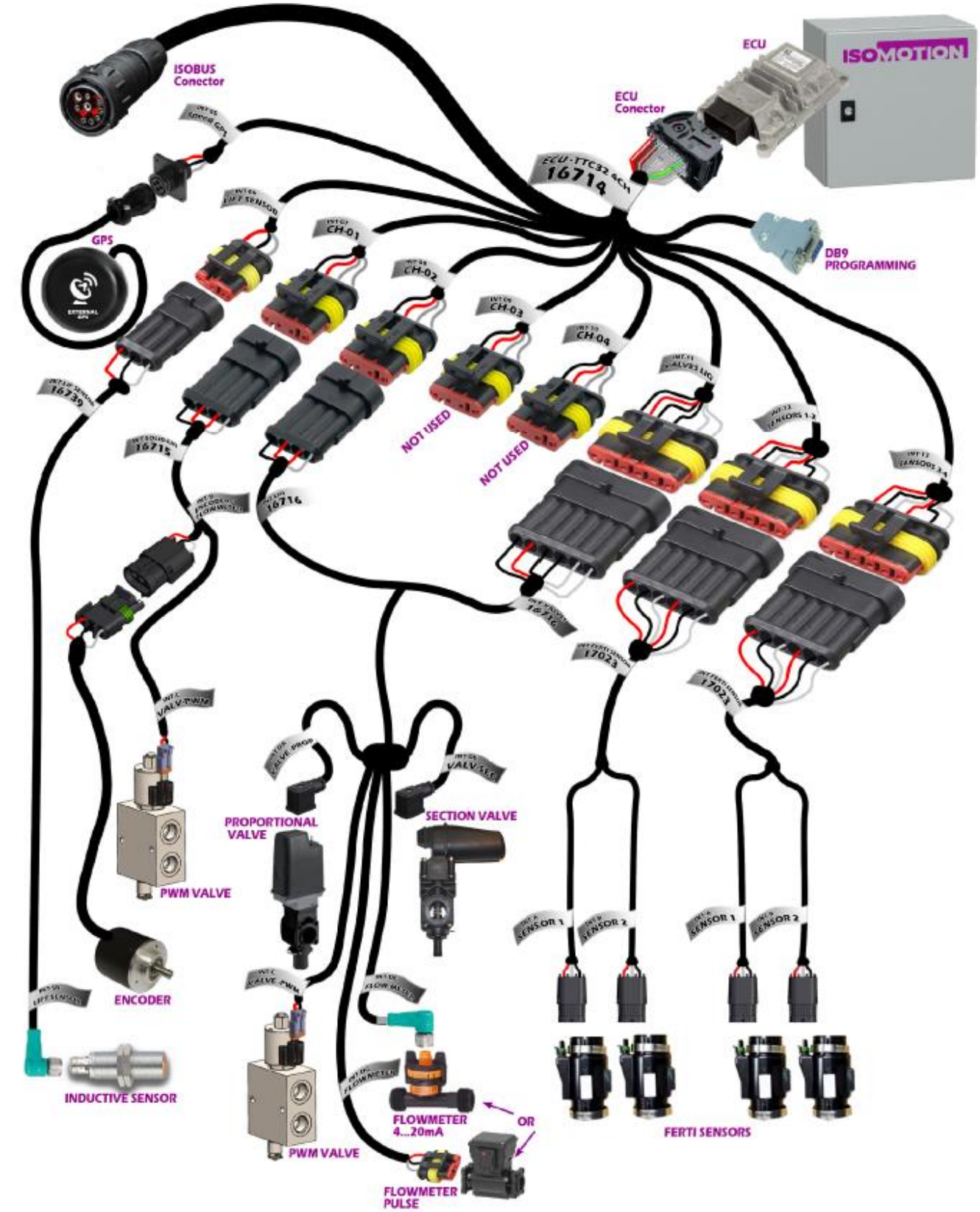
Code 05 Agitation system is running!



Pos.	Description
1	Operations Screen

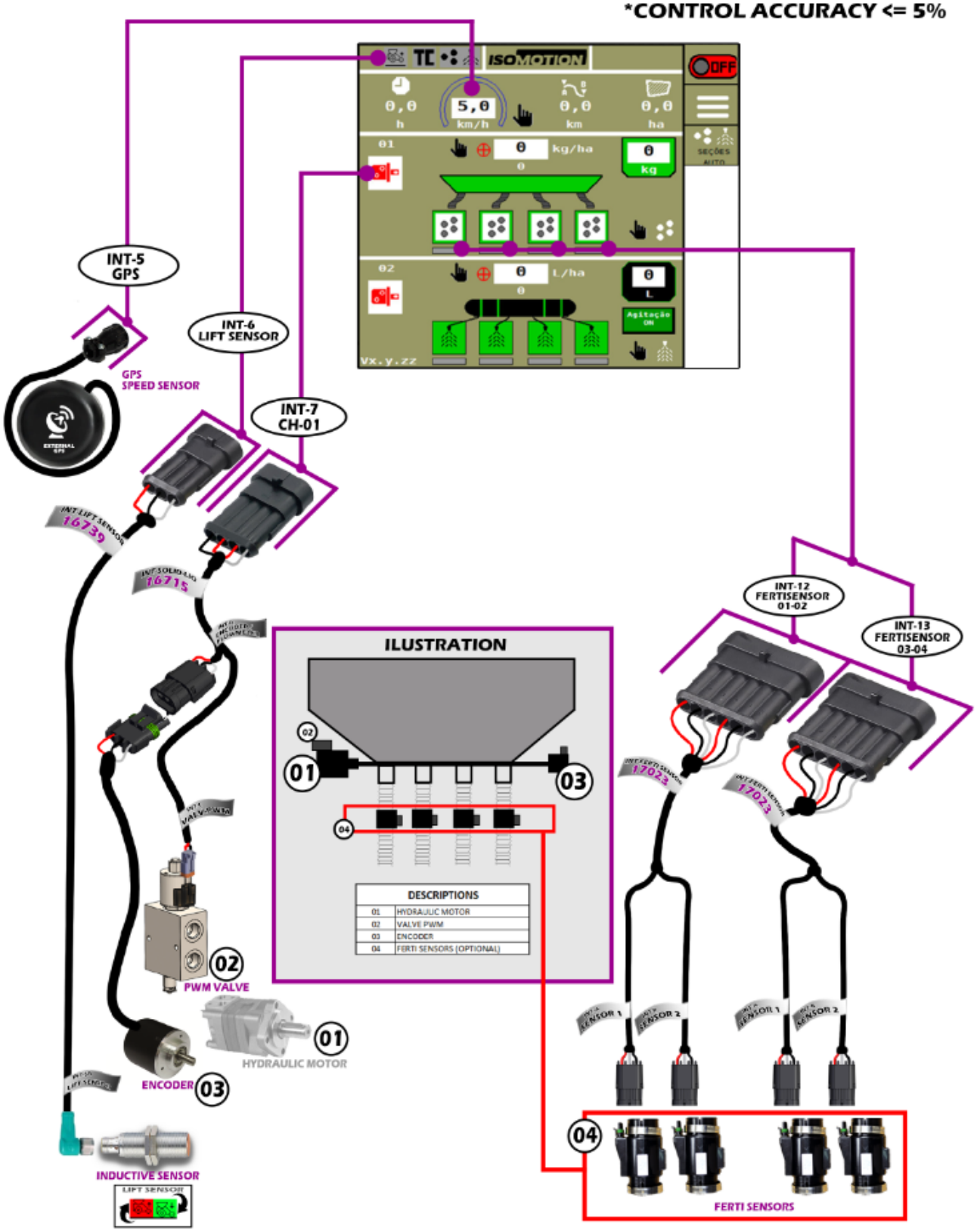
Technichal

OVERVIEW CONNECTIONS

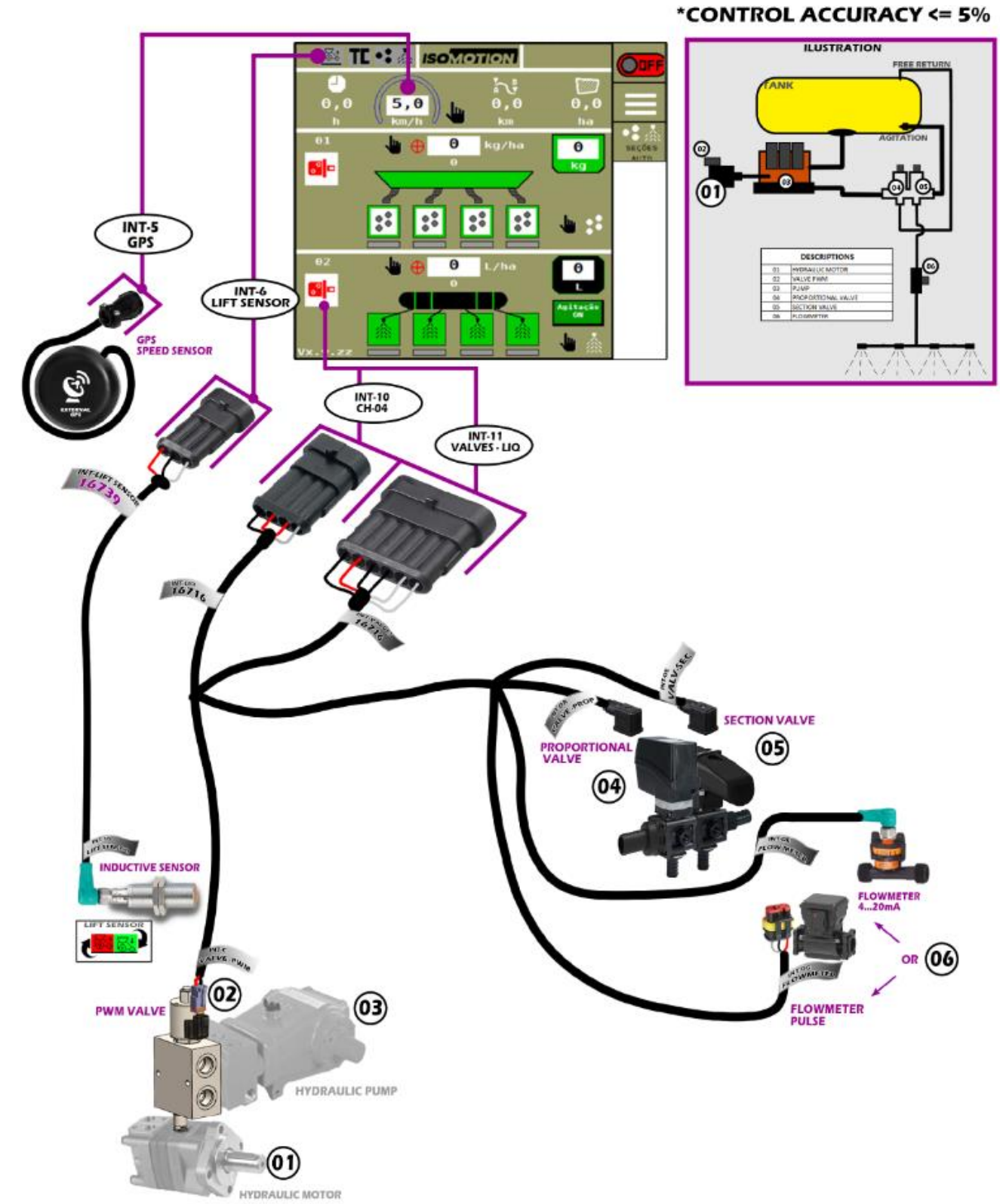


INSTALATION CH01

*CONTROL ACCURACY <= 5%



INSTALATION CH02



TECHNICAL ELECTRICAL

SUPPLY

NOMINAL VOLTAGE: 12Vcc

OPERATION

MODE OPERATION TASKS: CH01 & CH02
Just CH01
Just CH02

INPUTS

ENCODER INPUT: INPUT PULSE LEVEL HIGH 5V
LIFT SENSOR INPUT: DIGITAL INPUT PULL DOWN (LEVEL HIGH= IMPLEMENT DOWN)
FLOWMETER INPUT: ANALOG INPUT 4 to 20 mA
FLOWMETER INPUT: INPUT PULSE LEVEL HIGH 5V
FERTISENSOR INPUT: ANALOG INPUT 0 to 10V
SPEED SENSOR INPUT: INPUT PULSE LEVEL HIGH 5V

OUTPUTS

OUTUPT PWM: 120Hz current MAX: 3000mA
OUTPUT PROPORTIONAL VALVE: DIGITAL OUTPUT LOW SIDE
OUTPUT SECTION VALVE: DIGITAL OUTPUT HIGH SIDE

CONNECTORS


SUPER SEAL TYCO
MALE CONNECTOR: 282105-1


SUPER SEAL TYCO
FEMALE CONNECTOR: 282087-1


SUPER SEAL TYCO
FEMALE TERMINAL: 282110-1


SUPER SEAL TYCO
MALE CONNECTOR: 282106-1


SUPER SEAL TYCO
FEMALE CONNECTOR: 282088-1


SUPER SEAL TYCO
MALE TERMINAL: 282109-1


SUPER SEAL TYCO
SEAL: 281934-2


SUPER SEAL TYCO
MALE CONNECTOR: 282108-1


SUPER SEAL TYCO
FEMALE CONNECTOR: 282090-1


AMP TE
DT06-2S


AMP CPC
CONNECTOR: AMP-4ML 206430-1

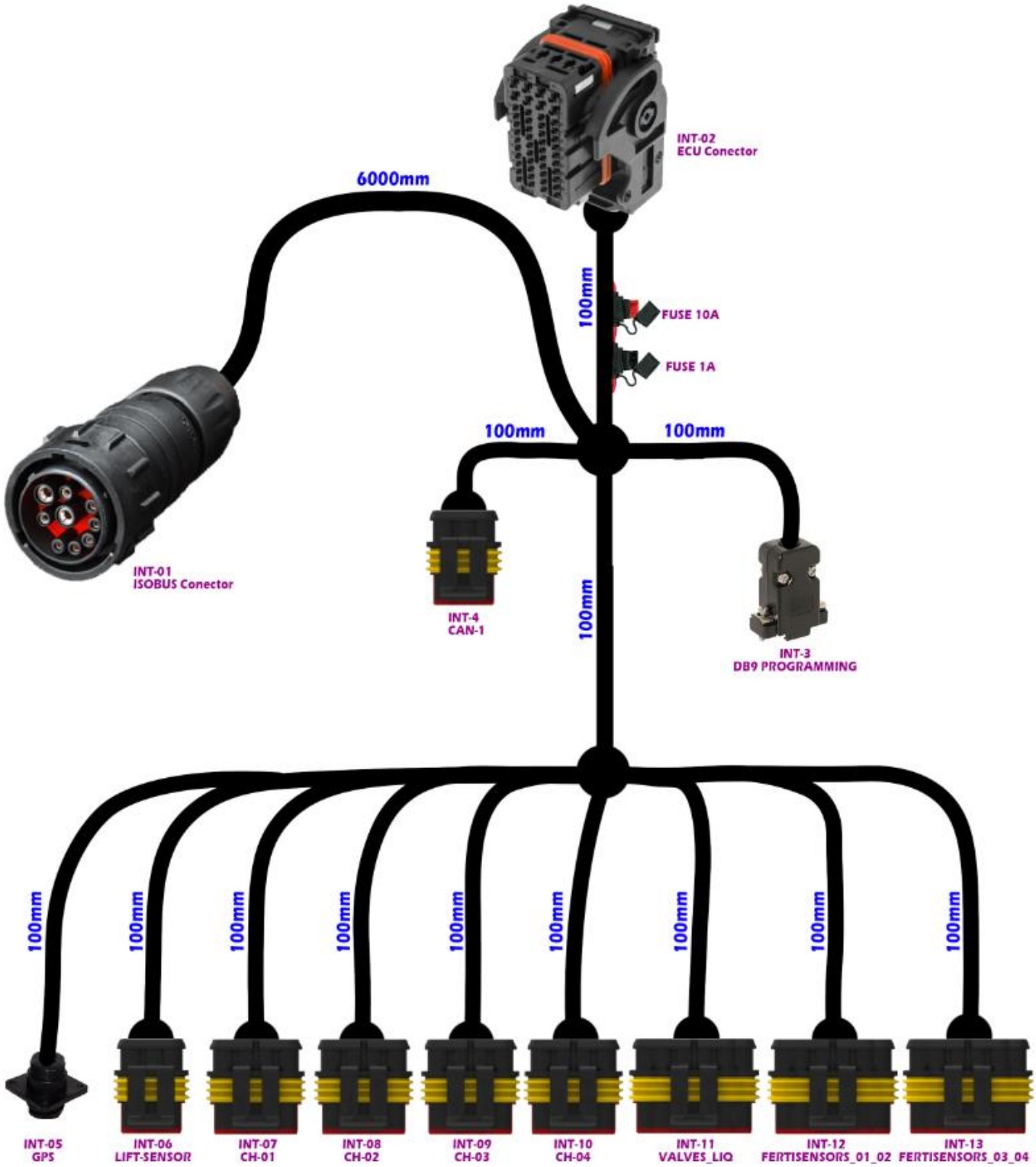

GENERIC
DIN VALVE FORM B

GENERIC
FEMALE M12 4 WAYS


DELPHI
12010717

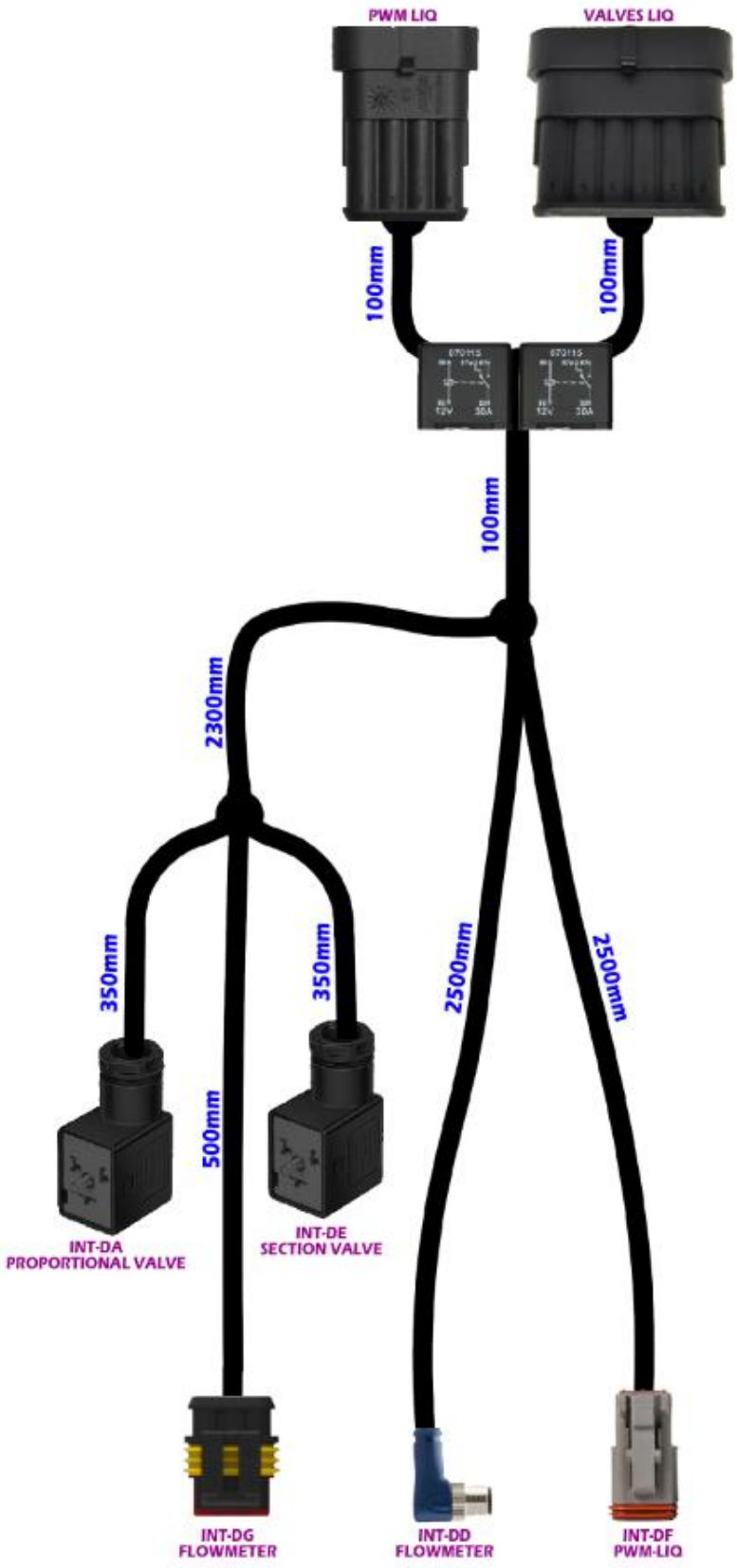
Cables

16714 - CABLE ISOBUS TTC32 4CH ECU

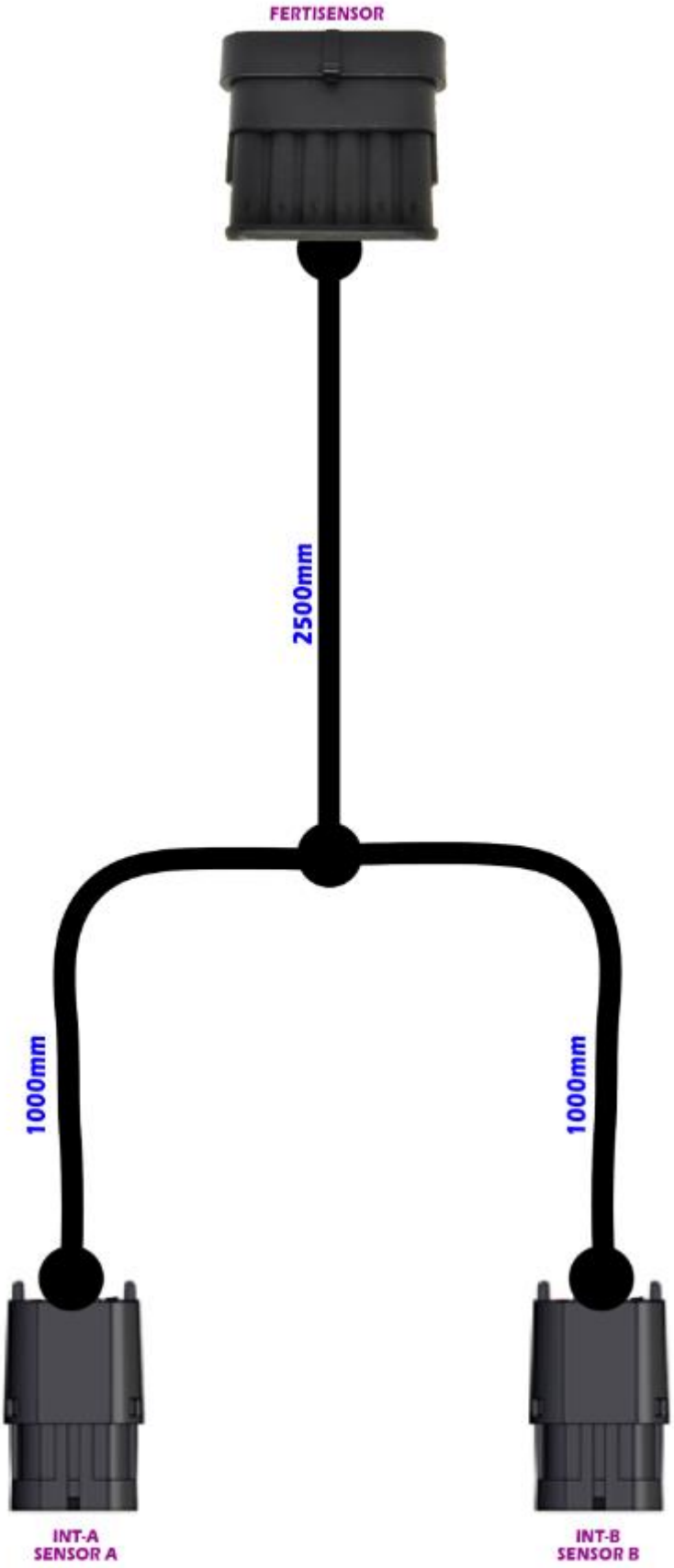


16715 - CABLE ISOBUS TTC32 4CH SOLID-LIQ

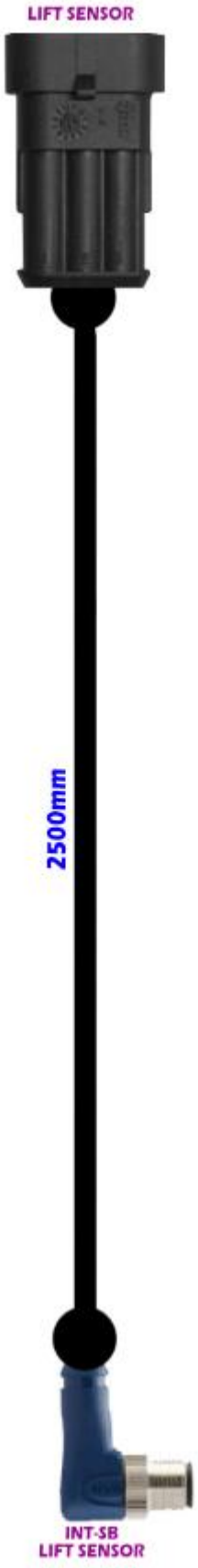
16716 - CABLE ISOBUS TTC32 4CH LIQUID SPRAYER



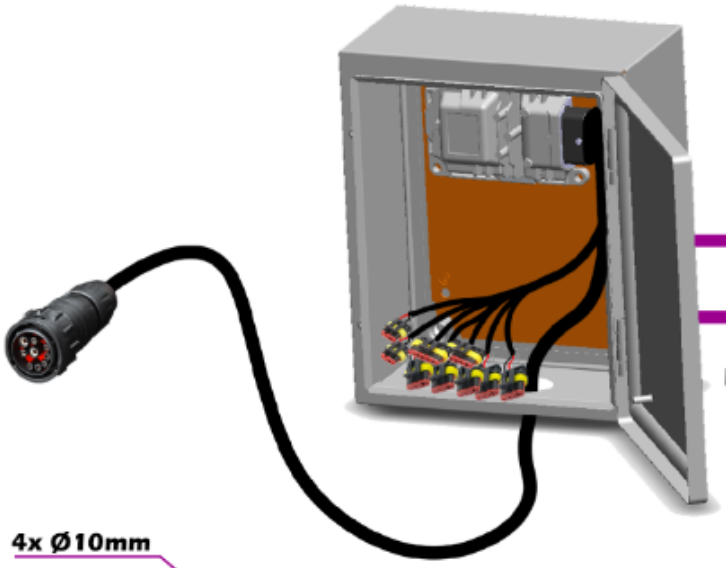
17023 - CABLE ISOBUS TTC32 4CH FERTISENSORS



16739 - CABLE ISOBUS TTC32 4CH LIFT SENSOR

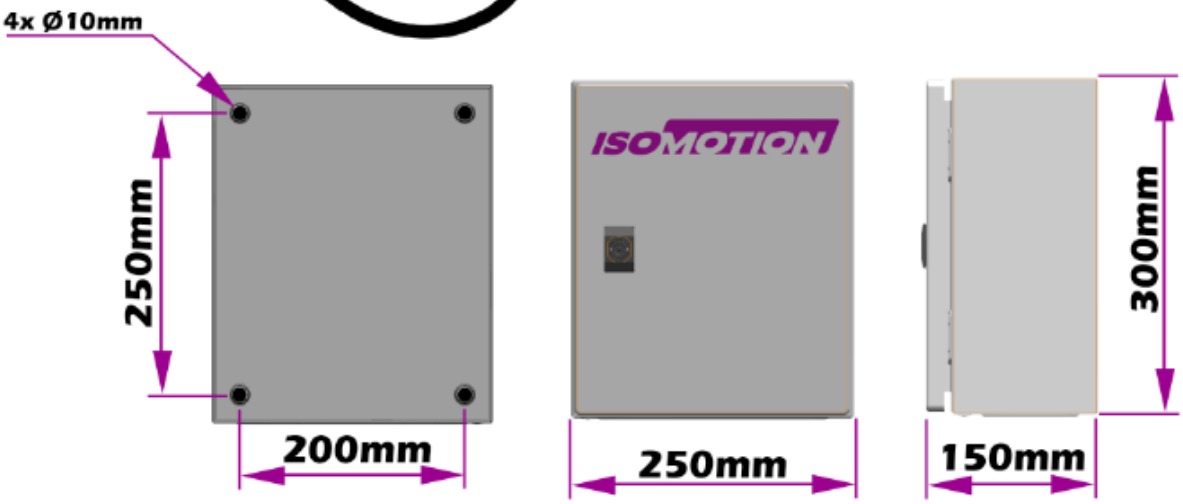


Dimensions



BOX

BODY MATERIAL: **STEEL**
DOOR OPENING SIDE: **REVERSIBLE 120°**
SURFACE FINISH: **EPOXY-POLYESTER**
COLOR: **Gray RAL 7035**



weight: 5,38kg
11,86 lb

INSTALLATION ACCESSORIES

16402		ENCODER ELASTIC COUPLING
16701		ENCODER SUPPORT

Codification

CH01 - SOLID FERTILIZER
CH02 - LIQUID SPRAYER

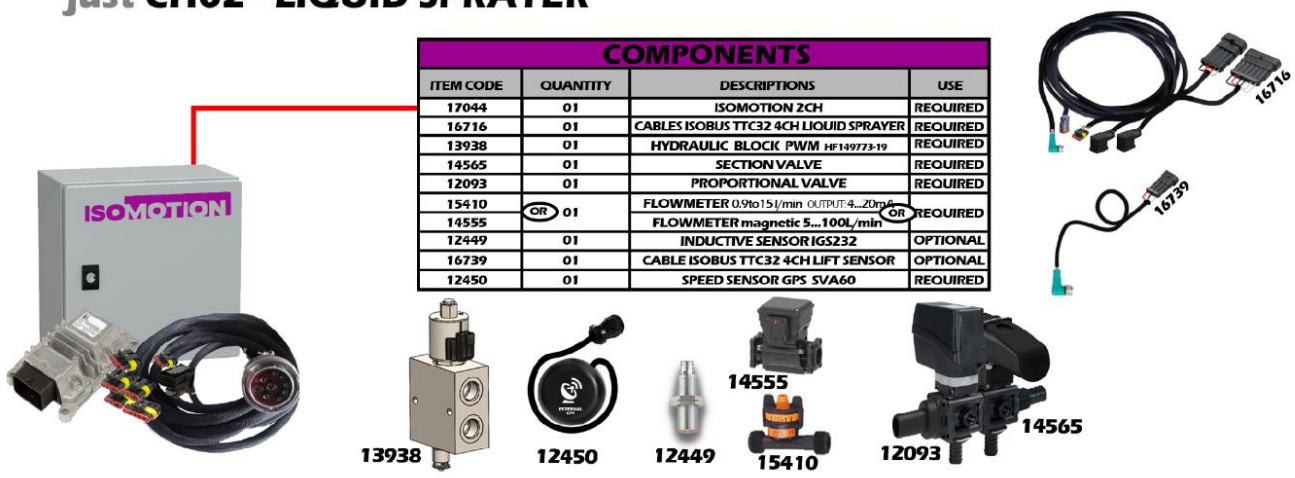
COMPONENTS			
ITEM CODE	QUANTITY	DESCRIPTIONS	USE
17044	01	ISOMOTION 2CH	REQUIRED
16715	01	CABLE ISOBUS TTC32 4CH SOLID/LIQUID	REQUIRED
15864	01	ENCODER INCRM. 360PR	REQUIRED
13938	02	HYDRAULIC BLOCK PWM HF149773-19	REQUIRED
12449	01	INDUCTIVE SENSOR IGS232	OPTIONAL
16739	01	CABLE ISOBUS TTC32 4CH LIFT SENSOR	OPTIONAL
12451	UP TO 4	FERTISENSOR 45mm	OPTIONAL
17023	01 OR 02	CABLE ISOBUS TTC32 4CH FERTI SENSORS	OPTIONAL
12450	01	SPEED SENSOR GPS SVA60	REQUIRED
16716	01	CABLE ISOBUS TTC32 4CH LIQUID SPRAYER	REQUIRED
14565	01	SECTION VALVE	REQUIRED
12093	01	PROPORTIONAL VALVE	REQUIRED
15410	OR 01	FLOWMETER 0.9to15 l/min OUTPUT:4...20mA	OR REQUIRED
14555		FLOWMETER magnetic 5...100L/min	

just CH01 - SOLID FERTILIZER

COMPONENTS			
ITEM CODE	QUANTITY	DESCRIPTIONS	USE
17044	01	ISOMOTION 2CH	REQUIRED
16715	01	CABLE ISOBUS TTC32 4CH SOLID/LIQUID	REQUIRED
15864	01	ENCODER INCRM. 360PR	REQUIRED
13938	01	HYDRAULIC BLOCK PWM HF149773-19	REQUIRED
12449	01	INDUCTIVE SENSOR IGS232	OPTIONAL
16739	01	CABLE ISOBUS TTC32 4CH LIFT SENSOR	OPTIONAL
12451	UP TO 4	FERTISENSOR 45mm	OPTIONAL
17023	01 OR 02	CABLE ISOBUS TTC32 4CH FERTI SENSORS	OPTIONAL
12450	01	SPEED SENSOR GPS SVA60	REQUIRED

just CH02 - LIQUID SPRAYER

COMPONENTS			
ITEM CODE	QUANTITY	DESCRIPTIONS	USE
17044	01	ISOMOTION 2CH	REQUIRED
16716	01	CABLES ISOBUS TTC32 4CH LIQUID SPRAYER	REQUIRED
13938	01	HYDRAULIC BLOCK PWM HF149773-19	REQUIRED
14565	01	SECTION VALVE	REQUIRED
12093	01	PROPORTIONAL VALVE	REQUIRED
15410	OR 01	FLOWMETER 0.9to15 l/min OUTPUT:4...20mA	OR REQUIRED
14555		FLOWMETER magnetic 5...100L/min	
12449	01	INDUCTIVE SENSOR IGS232	OPTIONAL
16739	01	CABLE ISOBUS TTC32 4CH LIFT SENSOR	OPTIONAL
12450	01	SPEED SENSOR GPS SVA60	REQUIRED



ISOMOTION®

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